

MECS ECO Follow up Study in Mangaltar, Kavrepalanchowk

FINAL REPORT

By: Practical Action Consulting Private Limited



Submitted To: Loughborough University, Modern Energy Cooking Services,
(MECS)

Abbreviations

CBS	Central Bureau of Statistics
CREE	Community Rural Electrification Entities
ECAs	Electric Cooking Appliances (EPC and Induction)
ECO	Electric Cooking Outreach
EPCs	Electric Pressure Cookers
EoI	Expression of Interest
GoN	Government of Nepal
HHs	Households
ICs	Induction Cookers
KVA	kilo-volt ampere
kWh	Kilowatt Hour
LPG	Liquefied Petroleum Gas
MoEWRI	Ministry of Energy, Water Resources and Irrigation
NACEUN	National Association of Community Electricity Users Nepal
NDC	Nationally Determined Contributions
NEA	Nepal Electricity Authority
PAC	Practical Action Consulting

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Executive summary

This study report provides an overview of the findings of a follow up study to the previous Electric Cooking Outreach (ECO) Pilot Study implemented at three villages (Mangaltar, Ramche and Pinthali) of Roshi Rural Municipality in Kavrepalanchowk district in 2021. During the original ECO Pilot study, the households from the study area (Mangaltar, Ramche and Pinthali) were provided with efficient electric cooking appliances- Electric Pressure Cooker (EPC) and Induction Stoves (ICs) and their use, electrical consumption and patterns were analysed. The ECO Pilot study was conducted among 44 households (HHs) in a community electrified through Bhumechuli Community Rural Electrification Entity or CREE (an electricity co-operative) and aimed to understand the cooking practices and preferences, and fuel choices of households through the implementation of the Cooking Diaries methods. ECO Pilot study lasted six months and commenced in August 2021.

The ECO follow up study was carried out one year later to understand the long-term changes in cooking practices, perceptions, and use of Electrical Cooking Appliances (ECAs) among the participants of ECO Pilot study after its commencement. The follow up study also assessed the changes in cooking behaviour, perception of non-participants of original ECO pilot and any impact the ECO pilot study may have imparted on their cooking preferences and practices. For the follow up study, 41 ECO participant households and 50 non-participants were assessed via separate structured household survey questionnaires. 10 ECO participant's HHs were also monitored over 2 weeks period using an adaptation of the cooking diaries method pioneered by MECS. The Cooking Diaries method matches meal and fuel choices with quantitative energy measurements in order to further understand cooking behaviour and the potential impacts of eCooking transitions on the local electricity supply. Further Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) were organised to validate information from household surveys, gather additional information and data.

Key takeaways from the ECO follow up study.

The ECO Follow up study findings highlight clear ongoing electric cooking use, with 83% of the ECO participants still using the ECAs provided through ECO Pilot study. Although the cooking diaries data shows the percentage of dishes cooked on electricity has decreased since the endline phase of the ECO pilot from 35% to 17%, the usage is still significant compared to the ECO baseline phase where there was zero electric cooking usage. In addition, the household survey data shows very similar usage (34% of dishes) to the earlier ECO study. Critically, the cooking diaries and household surveys carried out for the follow up study were recorded during winter season, during which 33% of participants households stated their consumption of firewood increases to provide space heating. This seasonal factor is likely to have contributed to the lower electric cooking use and higher firewood use compared to the endline phase. LPG use also increased slightly relative to the ECO endline phase.

Households using ECAs continue to perceive electrical cooking to be convenient, flexible, and easy to maintain/clean. The appliances were predominantly used to cook staple dishes (rice, lentils, curries) showing how the appliances are a good fit for local menus. The experience with electric cooking has also positively changed the participants perception towards safety and finances of electric cooking. The average increase in electrical bills with addition of ECAs was less than they initially expected. The increment in monthly electrical bills is on average 200 NPR (1.25 £) per month. Participants widely reported they felt the price of cooking on electricity is cheaper compared to the LPG gas where an average LPG (which cost 1800 NPR/11.25 £) last around 3 months equating 600 NPR (3.75 £) per month. Interestingly, the surveys suggest the participation of male and other family members like son, daughter have increased in cooking after injection of ECAs as their cooking tools.

Reported dislikes of ECAs were the longer cooking times compared to traditional stove top pressure cookers, some difficulties stir frying, power cuts impacting cooking, and need of compatible utensils with induction stoves imparting additional cost. These issues may be a factor behind why the array of dishes prepared with electrical appliances has slightly decreased. Repair and maintenance issues have occurred for a minority of households (7 cases (3 repaired while 4 damaged beyond repair) from a total 54 ECAs provided) and there is a need to improve skilled local manpower for repair and after sales facilities to increase consumer confidence. 65% of participants reported being unwilling to add or replace (if defunct) electrical cooking appliances in future citing lack of after sales services and high upfront costs.

The ECO Pilot study and word of mouth from ECO participants (83% recommend eCooking in their surrounding areas) appear to have helped in increasing the share of electric cooking in the area. 24% of non-participants surveyed bought ECAs within a year of the ECO pilot study finishing through the Market Activation Project of Practical Action which was initiated after the ECO pilot. The last mile distributors for the Market Activation Project credited the ECO pilot's successful demonstration and increasing awareness of electric cooking for playing a major part in their success in deploying additional ECAs in the area. Another major impact of the pilot enabling wider eCooking uptake in the area was the decision by the CREE to update their supply system, alignment of distribution and transformer capacity based on the recommendations from this study.

Perceptions of eCooking were generally positive among non-participants. Ownership of ECAs among non-participants strongly correlated with even more positive opinions and was the main reason given for non-participants changing their opinion on eCooking. The findings from the data are unclear regarding the impact the ECO pilot had in terms of contributing to these positive perceptions. Surprisingly, a majority (72%) of non-participants claimed they were not aware of the ECO pilot study and only 10 respondents (20%) stated they had discussed electric cooking with an ECO beneficiary. However, proportionally, ECO participants had greatest influence in terms of generating interest in

eCooking among non-participants, with the data showing eCooking discussions with other community actors were generally beneficial in increasing interest.

To build on the progress made by the ECO study, further sensitisation is required as many of the non-participants were unaware of the attributes of modern ECAs, holding outdated perceptions that electric cooking is unsafe (21% of non-participants) and expensive (38%). However, the vast majority (93%) of non-participants were aware of where ECAs could be bought which appears to be encouraging evidence of community awareness of ECAs and local ECA supply chains developing.

Recommendations

The research findings highlight how the ECO Pilot study has broad potential to serve as a launch pad for upscaling electric cooking in and around the study area through the following measures identified by the study.

Increasing Awareness on Electric Cooking: The ECO study shows how utilising the local ECO enumerators or leader among ECO participants as part of awareness creating on safety and usage of ECAs among the participants shall overcome number of prevailing taboos of the electric cooking. In particular, helping to make households understand the savings from usage of ECAs compared to LPG, which allows a monthly saving that makes the switch from LPG to ECAs economically attractive. Other pilot sites (from similar pilots in other part of country from ECO) can be utilised in the same way for ECA demonstration, use as training facilities and the participants can be utilised as champion campaigner. The positive outlook from the ECO pilot should be properly disseminated to increase the awareness and curiosity among the public.

Strengthening After Sales and Repair Services: The findings of the ECO study indicate the potential for training the ECO beneficiaries or project implementation team (e.g., local technicians and enumerators) to help address the urgent need for local after sales services. To support this, there is a need to develop comprehensive repair and maintenance manual for various types of ECAs as well as other materials such as brochures and pamphlets that provide generic guides for small repairs, spare parts availability, and details on various ECAs and available local suppliers. (The brochures or pamphlets can be series of documents with each one of them providing information on various topics also including common health and safety protocol, operation of systems etc).

Development of Electrical Supply and Distribution Standards that withstand Electric Cooking Drive: The ECO pilot findings highlight how a standard on the household power system should be developed and deployed so that the future system is robust and in line with the requirement of electric appliance. The pilot project undertook an energy audit of the households and supply system, also made necessary recommendation for required replacement. To support local upscaling, these learnings need to be populated in form of standard electrical system minimum pre-requirement for

households, local CREE, or local municipality for future connections so that their systems can be utilised for electric cooking.



1. Introduction

In 2020, Modern Energy Cooking Services (MECS) Program funded by UK Aid and managed by Loughborough University undertook series of electric cooking pilot studies. The consortium of Practical Action Consulting (PAC) Pvt. Ltd, Ajummary Bikas Foundation (ABF), and the National Association of Community Electricity Users Nepal (NACEUN) executed one of the Pilot studies (project title: “Analysis of Factors Affecting Adoption of Electric Cooking Options in Electrified Community of Nepal”) in area covered by Bhumechuli Mangaltar Rural Electrification Co-operative Limited (Bhumechuli CREE), located in Roshi Rural Municipality, Kavrepalanchowk district, Nepal. The study is termed as “ECO Pilot” Study was a rigorous exercise to understand the cooking behaviour and fuel choices of the households. The pilot study provided households with electric cooking appliance, their utensils and monitor the cooking behaviour, pattern, changes in cooking habit, applicability of electric cooking in rural area of Nepal. The idea was to support participants’ use of Electric Cooking Appliances (ECAs), understand local acceptance of ECAs and their willingness to use and pay for ECAs, assess the suitability of ECAs to cook local menus, and the capacity of local electricity distribution systems to support e-cooking. The pilot study was concluded in August 2021.

A year after the conclusion of ECO Pilot study, MECS program executed this contract to Practical Action Consulting to understand the long-term impact of pilot study, the current ground condition of the ECAs and understand any changes during and after the pilot study in the previous participant and their surrounding areas. This study report focuses on whether electric cooking practices have changed among the ECO Pilot study participants and assess whether electric cooking has spread wider into their community and to the households that were not ECO participants. In addition, this study has analysed opportunities and challenges to out scale electric cooking in the community/neighbouring areas.

1.1 ECO Pilot Study Findings

The Pilot study provided the households with electrical appliances, monitoring their use (including the impact of incentives), electrical usage, cooking patterns via cooking diary and electric metering.

1.1.1 Study Area

The final report of the ECO Pilot study states” the power supply capacity, existing load conditions, size of the consumer base, prior association with electric cooking projects, and the concerned CREEs’ demonstrated interest in increasing sales” were chief reason of selection of Bhumechuli CREE for the Pilot Study. Within the CREE area, three sites were selected based on the i) Strength and reliability of electricity distribution system ii) Type of settlements: clustered HHs, and iii) Road accessibility. The study area lies in Roshi Municipality of Kavre district, it is around 44 Km from nearest market centre-Banepa and around 70 Km from Kathmandu.



Figure 1: Location for ECO Pilot Study Area



Figure 2: Village Clusters for ECO Pilot Study

Mangaltar, Ramche and Pinthali villages were selected as intervention area for the pilot study. Mangaltar is connected to the headquarter of Kavre District- Dhulikhel and largest market of the district- Banepa via BP highway, lies in the highway itself. while Ramche and Pinthali are around 2 and 2.5 km from the BP highway and 4 and 6 km far from Mangaltar respectively. The total number of the HHs in Mangaltar, Ramche and Pinthali villages are around 70, 45 and 60 approximately. Majority of these households are connected to grid electricity through Bhumechuli CREE.

1.1.2 Household Selection

In participatory approach, the ECO Pilot study seems to have conducted number of demonstration events, selected local enumerators, created awareness about the study and requested all the households from the locality for the solicited Expression of Interest (EoI) to participate. Then the HHs were selected based on:

- The primary cook consents to participate and is capable of filling cooking diaries.
- Households that cook at least two times a day.
- Household that is willing to have a dedicated power socket in the kitchen and pay for house wiring and energy meter upgrade (from 5 Ampere capacity to 15 Ampere) if recommended by the energy auditors.

A total of 46 HHs were selected, two dropped during the study and a total of 44 HHs were finalized as the research participants to complete the ECO Pilot study.

1.1.3 Baseline Survey and Energy Audits

A baseline survey and energy audits in all participating HHs were carried. The baseline survey covered the information on socio-demographic characteristics, access to clean cooking, fuel choices, user behaviour, electricity supply status, and household decisions-related information. While the energy audits were to assess the capacity of existing the electrical connection and safety.

1.1.4 Electric Appliance Distribution

The participating households were provided with Induction Cookstove (IC), and Electric Pressure Cooker (EPC). The total number of ECAs provided to the households in the study area are shown in Table 1

Table 1: ECAs Types and Numbers among the Study Households

Village	Total HHs	Interventions (HH#)
Mangaltar	22	EPC+IC (15), EPC (3), IC (4)
Ramche	11	EPC+IC (6), IC (5)
Pinthali	11	EPC+IC (6), IC (5)

Along with the ECAs, one cooking utensils for each of the Induction Cookstove and equipment for cooking diary (weighing machines and table clocks) were provided to the study households. The participants were also given hands-on training on using and operating the appliances safely.

1.1.5 Cooking Diary

In cooking diary, the participating households recorded their meal types, measured the use of fuels (other than electric), the smart meters measured the consumption of electricity in daily basis for period of the study. The household were incentivised by paying one month of electric bill from the project. The data collection during the Cooking Diaries was segregated into three phases:

- a) Baseline phase (month 1): phase before the deployment of ECAs to the household where various demographic, energy, behavioural data were collected via structured surveys.
- b) Transition (or 'controlled') phase (month 2): the households were provided with ECAs, their monthly electrical bills were subsidised, and cooking diaries exercise were initiated to collect the information on cooking patterns, meals, timing etc.
- c) Endline phase (months 3-6): the subsidy and incentives were withdrawn; cooking diaries recording were continued to analyse the changes in cooking practices with removal of external influences.

1.1.6 Exit Survey

At the end of the study, a short household surveys were carried out with entire study households to understand the HHs' perception, fuel choices, and experience with the new electric cooking. The synopsis of the findings of the exit survey were as:

- All the appliances were in working conditions, few appliances had minor repair issues.
- All the household expressed their satisfaction on the performance of appliances. They stated cooking in electrical appliance was easy, fast, allowed flexibility to do other chores, require less attention alike other fuel sources etc.
- The households were happy to purchase another such appliance and to recommend the appliance to others.
- Male members of family's participation in cooking increased with the electric cooking. Few women members from the study had their scepticism whether such interest will last for longer duration.
- Households stated although cooking rice, lentils were much easier and convenient in electric appliances, but stir-frying vegetables (one of the main staples of a meal) was very difficult (often raw or burnt).

2. Objectives of the ECO Follow up Study.

The objectives of this study are.

- Analysing the longer-term impacts of the ECO pilot research on the ECO participants, whether Electric Cooking practices have changed and how.
- Understanding the implication of the ECO Pilot research project into the wider community, understanding non-participant views of Electric Cooking and whether there has been greater awareness.
- Understanding the approach within the scope of ECO Pilot research to escalate the uptake of ECAs within the study area through a market-based approach.

3. Methodology

The research methodology can be divided into three phases: i) Planning Phase ii) Implementation Phase and Post-Implementation Phase. Figure 1 below shows the schematic representation of the research methodology that was adopted for this research.

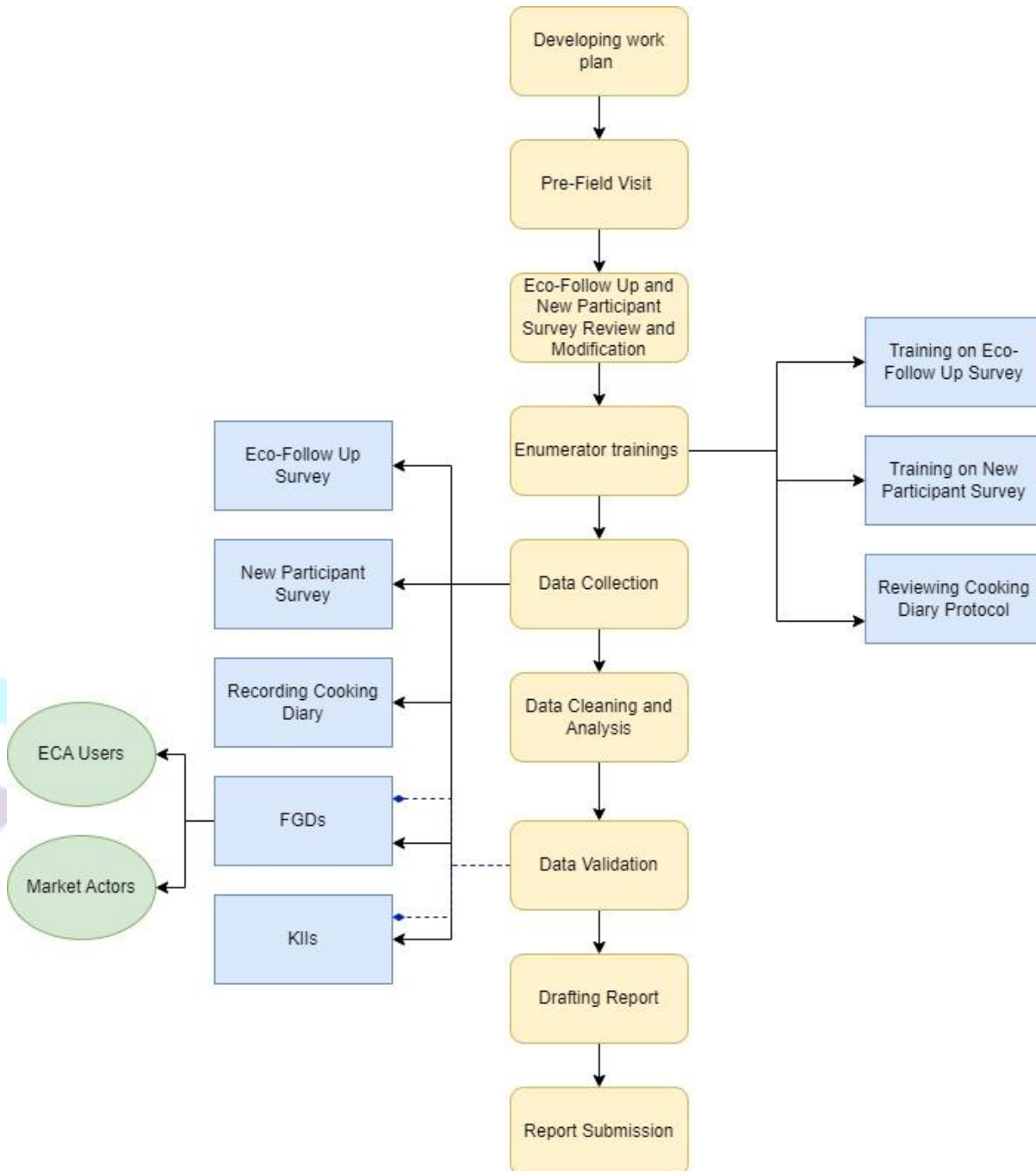


Figure 3: Schematic Diagram of Research Methodology

3.1 Planning Phase

3.1.1 Developing Workplan

Based on the Terms of Reference (ToR) of the research assignment, the research team developed a work schedule. The timeline of the activities performed are shown in Figure 4.

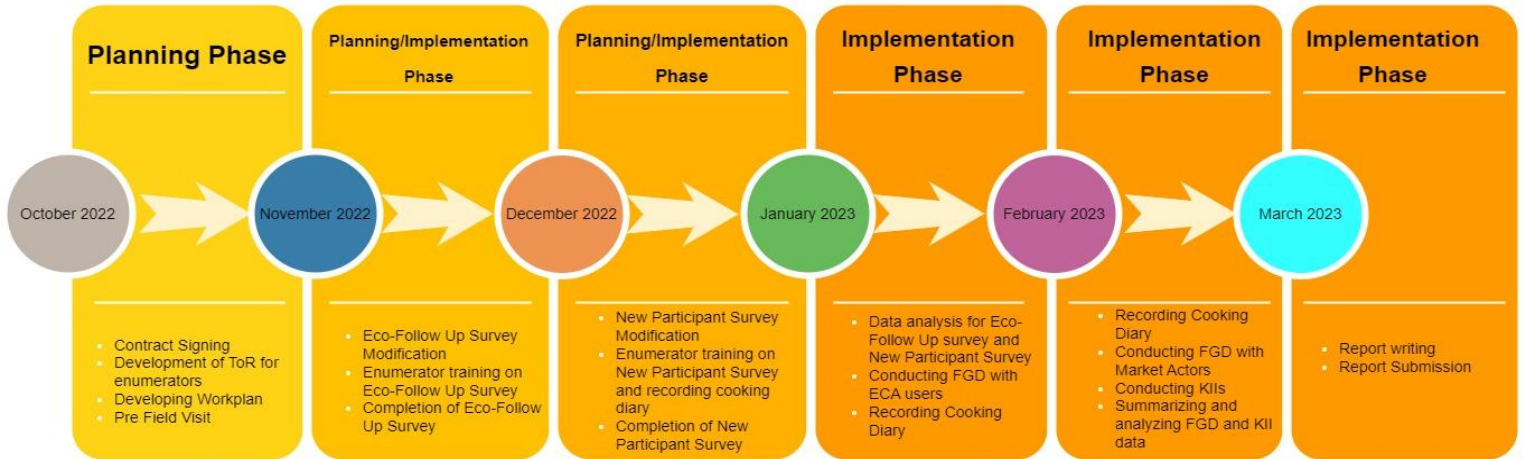


Figure 4: ECO-Follow Up Study Timeline

3.1.2 Field Visit

A field visit was organized to visit the ECO Pilot research project participants. The objective of the visit was to have preliminary idea about the ECA usage status among the research participants. The major outcome of the visit was to confirm the sample size for the ECO-Follow Up Survey. The team learnt three (3) households that were part of previous Pilot study have either migrated or transferred the electrical appliance to their relatives/kin that were not living in the area. Also, in few of the households either both or one of the provided electrical appliance was not functioning. This led the decision to cover all the available households (41) in the follow up study although the assignment Terms of Reference mandated requirement of 30 samples for the ECO-Follow Up Survey. The resource and time allocated in this assignment allowed the research team to take decision to cover entire reach participants form the ECO Pilot study which further strengthens the database for this assignment.



Figure 5: Observation of ECAs in the Household at Mangaltar Village

3.1.3 Modification on Household Survey

The ECO-Follow Up Survey draft was provided by MECS. The survey comprised of the general question which needed some modification to suit the Nepalese context and the research team made modification to add few questions on perception, cost of using electrical appliances and acceptance of electrical cooking practices in locality. The research team in coordination with MECS modified the questionnaires in the Kobo Toolbox. The questionnaires and raw data have been provided to MECS as separate document. The first draft of survey questionnaires was provided by MECS. The research team did not make major changes to this survey.

3.1.4 Enumerator Training

The enumerator trainings were conducted in two phases, one for the follow up survey and another for the Non-Participants survey. In the first phase, one-day training was organized to enable the enumerators to collect data using on ECO-Follow Up Survey via Kobo Toolbox. During the training, first, the research team together ran through all the questions in the survey to understand the skip logics included in the survey. Every question was dealt were scrutinized based on the difference in level of understanding among the enumerators. Later, role play was done where each enumerator was paired with research team members to conduct the survey. This procedure was repeated by changing the members in the role play pairs. Any questions in which the enumerators had confusion or different understanding were noted and addressed together following the role play to conduct the survey. Similar approach was used to conduct the training for Non-Participant survey. The enumerators were also engaged in reviewing and devising the Cooking Diary Recording Protocol for intensive cooking diary exercise.

3.2 Implementation Phase

3.2.1 Households Survey

Like enumerating training, the household survey was also conducted in two phases. Following the completion of first enumerator training, the enumerators started to collect data from research participants from ECO Pilot project. As mentioned earlier, the data from available 41 households were collected and recorded in the kobo which took around 5 days to complete.

“After the commencement of Initial Eco pilot study, Practical Action Nepal initiated a project called “Market activation of electric cooking in Nepal” within the study area; Mangaltar Village. The project had been disseminating ECAs through a market supply chain, where the households are provided with electrical cooking appliances in a subsidized rate (HH make certain percentage of payment as per the market rate”. For the Non-Participant survey, the enumerators were advised to take approx. 5% households who had procured ECA through this ongoing project of Practical Action Nepal. As this study’s enumerators were locally based, the team together with enumerator made the decision on the non-participant’s survey targeted households, the project staffs from ongoing project also helped in identifying and commencing the surveys of their beneficiaries. Altogether 50 households were surveyed in three villages (Mangaltar, Ramche and Pinthali).

3.2.2 Recording Cooking Diary

For this assignment, cooking diary was recorded for 2 weeks (14 days). Intensive form was used for recording the cooking diary. The protocol used for cooking diary was similar to recording of the cooking diary for the Intensive Baseline Phase during the ECO Pilot Study.



Figure 6: Indu Lama Participating in the Cooking Diary Exercise

10 households had agreed and participated in recording the cooking diary for 2 weeks. The Ramche village had to be avoided for the cooking diary exercise as the enumerators hired for this study belonged

to Pinthali and Mangaltar and travelling to Ramche would have been cumbersome. Moreover, the route going to the Ramche goes through the forest and secluded area and therefore deemed to be risky for the enumerators.

3.2.3 Data Cleaning

The collected data were analysed to check for any outliers. The identified outliers were noted, and enumerators were consulted to know the reason for presence of outliers. While the Follow Up Survey data had some outlier, but the Non-Participants Survey data did not have any outliers.

3.2.4 Focus Group Discussion and Key Informant Interview

Two Focus Group Discussions (FGDs) were organized during the research implementation phase. The first FGD was with the Eco Pilot participants household’s members in extracting information on their cooking perceptions, changes and rechecking/validate few details of the household surveys. A detailed checklist was prepared on the questionnaire for the FGD, the participants were identified based on their HH survey information and demography. The FGD was also recorded and following the conclusion the discussion was summarized and analysed. The FGD was conducted with ECA user group and existing market supply chain actors. The first FGD with user is termed as “FGD-1” and second as FGD-2. The list of participants is shown in ANNEX I. Apart from FGDs, Key Informant Interviews (KIIs) was also conducted to collect relevant data to address the research questions mentioned in this assignment. The list of people interviewed during KII are shown in Table 2. The data collected from FGDs and KIIs has been used to validate the household survey data and analyse the findings to provide recommendations based on the research questions.

Table 2: List of Stakeholders for Key Informant Interview (KII)

S.N.	Name	Organization/ Institution	Designation	Contact Number
1.	Dinesh Lama	Roshi Rural Municipality Office	Chairman	9851157982
2.	Ram Bahadur Tamang	Roshi Rural Municipality Office	Chief Executive Officer	9851125845
3.	Janam Tamang	Ward No.9, Office, Roshi Rural Municipality	Chairman	9869490716
4.	Indra Kumar Shrestha	Bhumechuli CREE	Chairman	9841693267



Figure 7: Interviewing Chairman of Bhumechuli CREE



Figure 8: FGD with ECA Users



Figure 9: Interviewing Roshi Rural Municipality Chairman



Figure 10: Interviewing Ward No. 9 (Study Area) Chairman

3.2.5 Data Analysis

Microsoft Excel was used to analyse the household survey data and data obtained from Cooking Diary. The FGD discussion was recorded, and the recordings were referred during the data analysis. The qualitative data obtained from FGD, KII and household surveys were elaborated to complement the quantitative data obtained from household surveys. The findings from FGDs and KIIs are also shared as separate file with MECS.

3.3 Post Implementation Phase

The analysed data were interpreted to develop the report. The first draft of report was shared with MECS to get their feedback and suggestions. Prior to submitting the final report, the comments, feedback, and suggestion received from the MECS was addressed.

4. Findings and Discussion

This Follow up study is divided into three data collection mode, household survey with the participants of ECO Pilot Study, household survey with ECO Pilot’s non-participants and cooking diaries with selected ECO participants. The following sections describe, compare, and analyse the results of these three follow up data and information. Wherever possible comparisons are drawn with the ECO Pilot data to analyse what has change in the neighbourhood of Mangaltar regarding Electric Cooking after the completion of ECO pilot study.

4.1 ECO Follow Up Participants

As shown in Table 3, Forty-One (41 participants from three villages of the follow up survey were the same households who were part of the ECO Pilot study. Among the respondents twenty-seven (27) were female and remaining (14) were male.

Table 3: Changes in Study Participant Numbers

Area	Follow Up Study	ECO Pilot Study	Remarks
Mangaltar	20	22	One participant has migrated, and another gifted to her daughter who doesn't reside in the area
Ramche	11	11	
Pinthali	10	11	One participant has migrated

The current respondents were provided with either EPC, Induction Stoves, or both during ECO Pilot Study. The total number of ECA provided to the households are shown in Table 4.

Table 4: ECA Distributed Among ECO Pilot Study Households

ECAs	Number
EPC	14
Induction	14
Both	13

To understand the long-term impact of the project to the ECO pilot participants, their cooking behaviour, practices and perception, this section of report shall compare the findings from ECO follow up survey and FGDs with ECO pilot study findings and with findings from exit survey and other phases of ECO Pilot study where possible.

4.2 Electrical Cooking Appliances Status Post ECO Pilot Study

During the ECO Pilot’s exit survey, all the distributed electrical appliances were recorded to be in working condition and were being used regularly. During the follow up study it was recorded that, among the distributed electrical cooking appliances into Forty-One (41) households, thirty-seven (37) household still have the appliances in working condition, three (3) have been damaged beyond repair and one household replaced the appliance when it was damaged. It should be noted none of the EPC are damaged, the three cases of damage are of Induction stove.

Among the thirty-seven (37) household with appliance in working condition, thirty-four (34) of them are using the appliances whereas three (3) household do not use them anymore. One household felt the electricity charges increased due to appliances, another does not prefer cooking in electrical appliances and in one household after their daughter, who used to cook in appliance, left for her higher studies and they stopped using it.

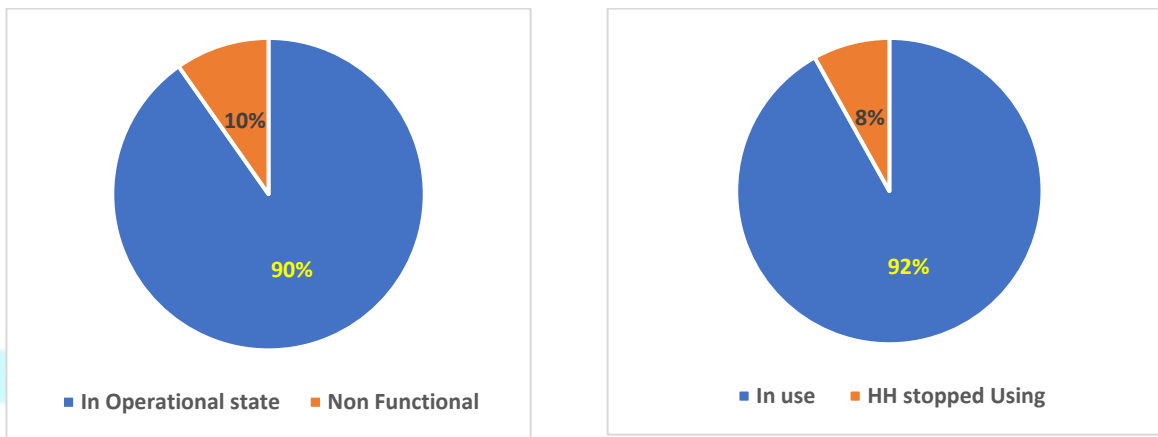


Figure 11: Proportion of Functional and Operating ECAs

4.3 Electrical Cooking Appliances Use Post ECO Pilot Study

Most participants (73%) reported that the frequency with which they used their ECAs was the same as during the ECO pilot study while a minority (27%) stated their use had decreased. Among those using the ECAs less, few felt they did not like the taste of the food, and some hinted they used the electrical appliance in higher frequency due to incentives during the Pilot study and their interest has been dropped since. However, when these participants were invited in the FGD, the group had overwhelmed consensus that the frequency of use has increased not decreased after the ECO Pilot study. All the participants of HH survey answered the frequency of use of LPG is similar during and after the Eco Pilot study.

4.3.1 Fuel Usage and Stacking

The cooking diary exercise conducted with 10 households for a period of 2 weeks was focused on understanding the use of various fuels in usual cooking practices. The current diaries when compared to the cooking diaries finding from ECO pilot phase shall help in understanding the long-term fuel usage pattern, fuel stacking and behavioural changes among the households. According to the Figure 12.

- The Electrical appliances (EPC and Induction) are used less (almost half) compared to the endline phase, but still account for 17% of dishes cooked compared to 0% in the baseline phase.
- The usage of EPC has dropped almost three times while the drop on Induction use is less than half compared to Endline phase. But we notice a steady decline from transition to endline and existing phase, the decrease in electric cooking use between the transition and endline phases in the original ECO pilot is largely explained by the removal of incentives used in the transition phase which covered electricity costs for participants.
- The use of firewood has increased twice from the endline phase of ECO pilot study and is equivalent to the baseline phase of the ECO pilot before ECAs were introduced. Households appear to have resorted to their initial firewood use practices.
- The use of LPG has also increased compared to the endline phase however it is notably lower than the baseline phase before ECO interventions.
- In long term, the electrical appliances have replaced the share of LPG and Bio-gas fuels in the households. Firewood usage is similar before and after interventions from ECO Pilot study.

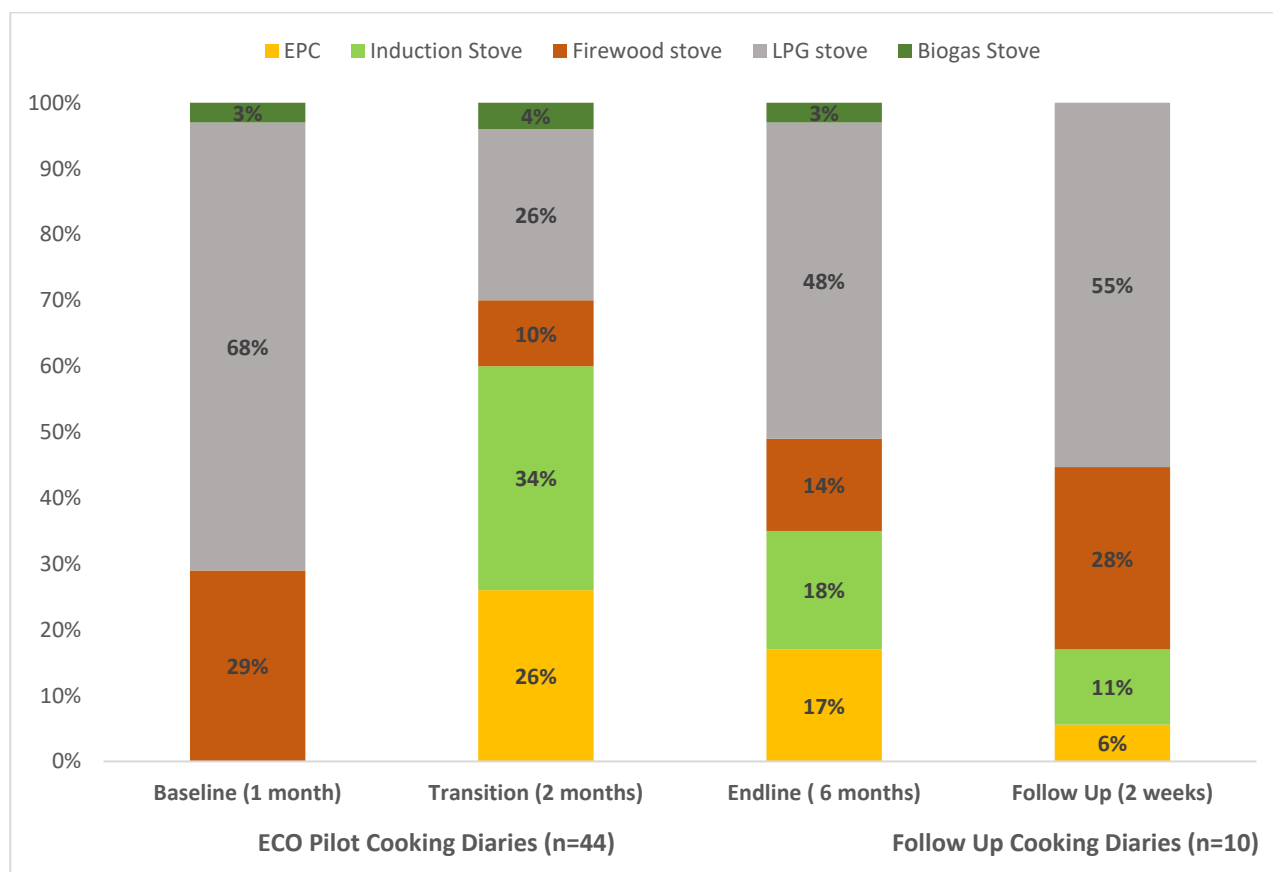


Figure 12: Percentage of Dishes Cooked Per Fuel

Similarly, the data from the Follow up household’s survey were also stacked and compared with the cooking diaries findings.

Table 5: Number of Dishes Cooked per Fuel

Fuel	Total no of dishes cooked on the fuel	% of overall total dishes
LPG	165	56.1%
EPC	41	13.9%
Induction	58	19.7%
Firewood	30	10.2%

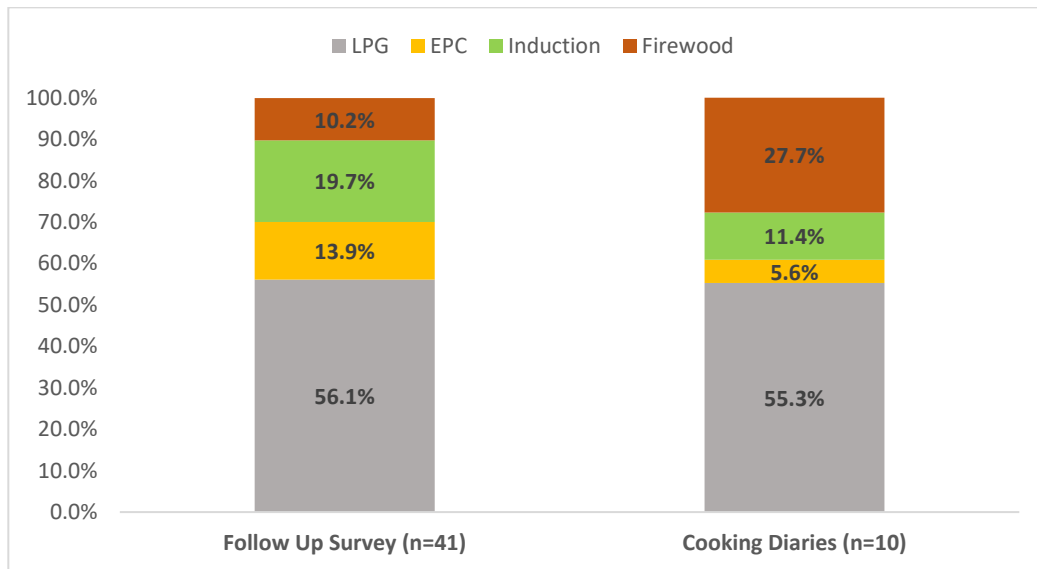


Figure 13: Comparison of Dishes Cooked in various Fuel between Follow up and cooking diary data for a typical day.

- The follow up survey data indicates the 41 households have a much cleaner fuel stack than the cooking diaries participants (10 households), with twice as much electric cooking and almost three times less firewood used.
- The follow up survey data shows almost identical usage of LPG compared with the cooking diaries data.
- 27% of the 41 follow up survey participants stated they are using electrical appliances less compare to ECO Pilot phase whereas the cooking diary from 10 sample household shows the decrement in use of electrical appliance is around 50%.
- The use of ECAs indicated by the follow up survey data (34% of dishes) is very similar to that reported in the endline phase of the ECO pilot study (35% of dishes).

Although the cooking diaries collect the micro data on cooking fuels, meals, time etc but the findings from the cooking diaries shows stiff contrast with the follow up surveys and with FGDs. Further assessment on cooking diaries and follow up household data were undertaken in the following sections (Analytics A and Analytics B) to identify pattern, reasons, and outliers (if any) behind the differences between the cooking diaries data and household survey data,

Analytics A: ECO Follow Up Survey on Cooking Fuel’s Frequency.

In a typical day, 57% of household survey respondents cook 2 times while 27% cook 3 times and around 16% cook more than 3 times. The percentage share of various cooking fuels in cooking frequency shall allow comparing contrast between frequency from follow up survey.

In follow up household survey, the participants households were asked how frequently they used (per day and per week) various cooking fuels at their disposal. The frequency of use of EPC and Induction Stove are much higher compared to Firewood Stoves.

Table 6: Frequency of Use of Cooking Fuel

Stove Types	Overall Use	> 3 times a day	3 times a day	2 times a day	Once a day	2-3 times a week	Once a week
LPG stoves	98%	7%	25%	46%	17%		2%
EPC	56%			49%		5%	2%
Induction Cookstove	56%		5%	41%	10%		
Firewood Stoves	34%		2%	20%	7%		5%

Analytics B: Cooking Diary and ECO Follow Up’s Meal with Cooking Fuel Breakdown

Majority of household cook 2 times a day (Lunch and dinner). Only 6% of household regularly prepared breakfast and 2% cooked afternoon snacks respectively (drinks with snacks). Breakfast usually consists of small snacks (boiled egg, chickpeas) and milk or tea and A typical lunch consists of Rice, Lentils, vegetable curries, leafy greens, meats etc. Afternoon snacks were also chiefly tea accompanied with small snacks (flat bread, biscuits etc) and A typical dinner also consists of rice, lentils, curries or leafy green, meats etc.

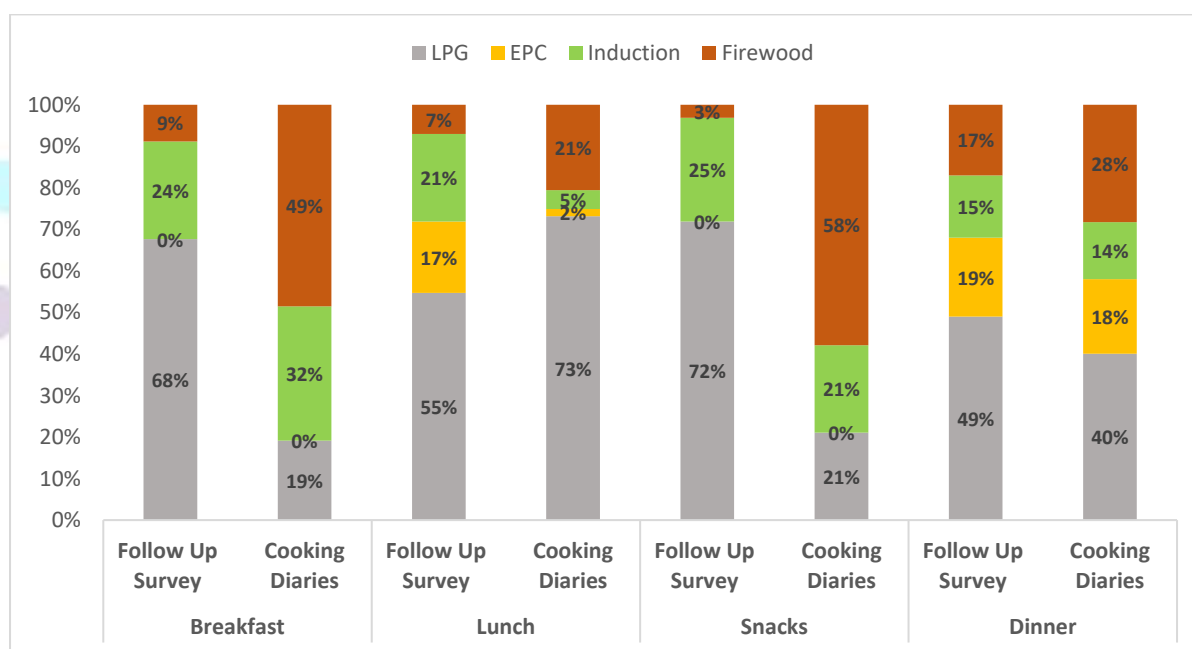


Figure 14: Follow Up Versus Cooking Diary (Cooking Fuel use as per Meals)

Breakfast and Afternoon snacks: cooking diaries show firewood being used more while LPG and Induction Stove much less than the stats from the follow up survey.

Lunch: Again, the firewood uses are higher with LPG and Induction Stove are much lesser compared to follow up data. Rice is the staple among the lunch, with EPC, which is designed to cook dishes like rice, which is surprisingly used in a low frequency among the cooking diary participants household.

Dinner: The stat of the cooking fuels for the dishes of dinner are very comparable, but the share of firewood is higher compared to follow up survey data.

The time of year is likely to be a key factor explaining the differences between the lower use of ECAs in the Follow up study cooking diary data compared to the ECO pilot endline phase:

- The cooking diary exercise were conducted during peak winter season (last week of January and first week of February), the firewood consumption in winter is generally higher, additionally for heating. While the ECO pilot cooking diaries were recorded from March to August (spring-summer and monsoon)
- During the Follow up survey, the participants were asked if the seasons impacts their cooking behaviour, 50% of the participants responded it does and among 33% of that 50% replied “they use firewood more (for heating purpose) in winter so electric are not preferred”.
- Winter (Dry season as per electrical generation nomenclature) are the period where households’ experiences power cuts. 80% of participants stated they had power cuts in the system ranging from few minutes to few hours (discussed in detail in latter section of this report). Power cuts impacts the cooking fuel choices.
- In addition, in this Follow up study cooking diary were collected for a shorter duration of 2 weeks with nearly 25% of follow up participant’s sample, whereas the ECO pilot study’s cooking diaries were around 6 months of extensive data collection with 44 household sample.
- The diverse participants in the FGD expressed their satisfaction over the EPC in cooking common dish like rice with expression such as “easy to use”, “wish to add EPC as they didn’t receive as part of ECO pilot”, “flexible in cooking” etc. However, the cooking diary shows in the period of data collection (2 weeks), none of the participants used EPC to cook rice for lunch.

4.4 Changes in Use of Electric Cooking Appliances

Understanding how the electrical cooking appliances are used after the ECO Pilot study is segregated into three key sections:

Section A: Comparison of Dishes Prepared in EPC and Induction Stoves with ECO Pilot Phases Cooking Diaries

The ECO pilot study reports shows that there was array of the dishes that were cooked during the pilot study phases with the Electrical appliances. The common dishes such as rice, lentils, curries (soup and fried), leafy greens, meat, milk, mush (dheedo), noodles with prepared during the pilot study phase. The data from both the follow up survey and cooking diaries from this follow up study indicates the array of dishes prepared in electrical appliances has decreased.

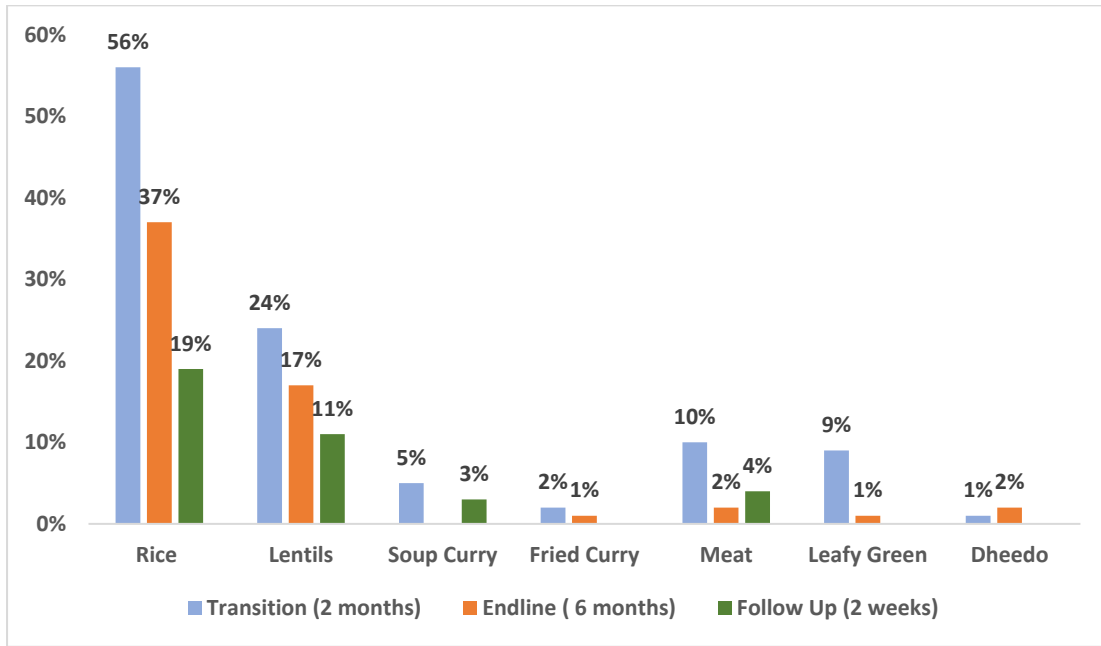


Figure 15: Percentage of Each Dish Cooked in EPC

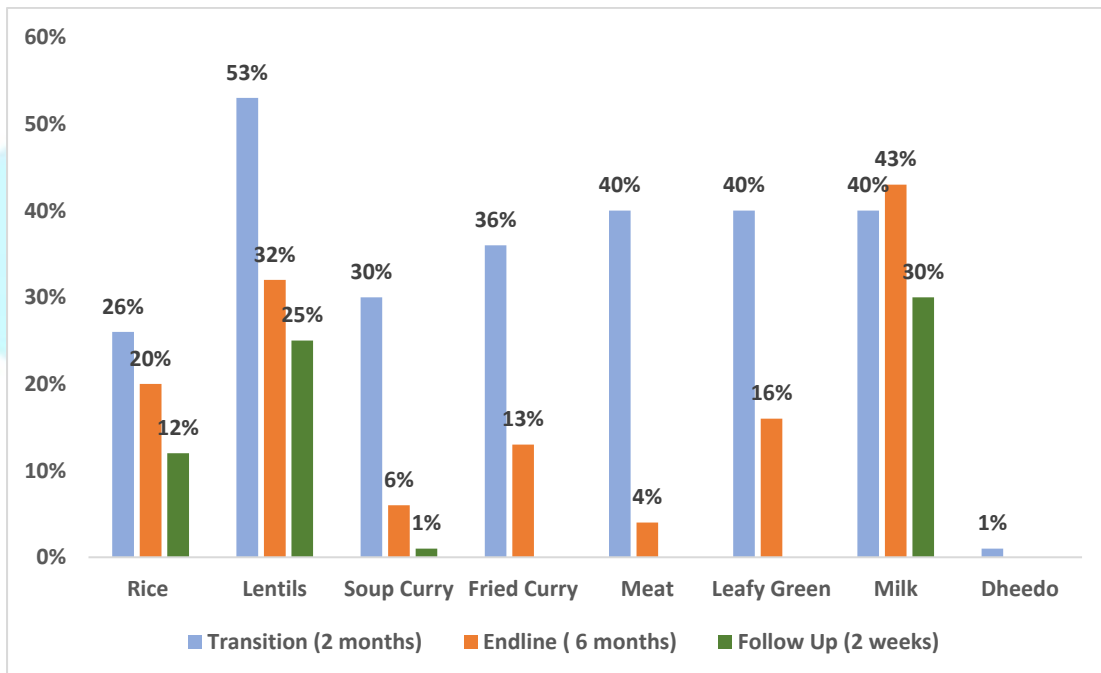


Figure 16: Percentage of Each Dish Cooked in Induction Stove

The ECO pilot phases when compared to current cooking diaries show:

- The use of electrical appliance (EPC and Induction Stove) has proportionately decreased in cooking various dishes and meals in the area, compared to ECO pilot phase.
- EPC now is mainly only used for the staple dishes of Rice and lentils and in preparing soup/curry and meat on few occasions. Deep/stir frying and mushing dishes are no longer prepared using EPC.

- Similarly, Induction Stove is also only used to prepare the staple dishes of rice, lentils, curries as well as boiling milk. It is also not preferred for Deep/stir frying and mashing dishes.

During the follow up surveys, around 25% of household stated that they experimented due to curiosity by cooking varieties of dishes with the electrical appliances during the ECO Pilot phases but not much after the study (the transition phase of ECO Pilot was incentivised). 22% of households during follow up survey mentioned that they feel stir frying and other types of frying in electrical appliances are difficult (detail in section 4.5.1). Also, during the focus group discussion, participants were in consensus that they felt frying and cooking vegetables or preparing curries were difficult in the electrical appliances. The survey data and cooking diaries indicates the change where electrical cooking appliances are limited to use in certain dishes only compared to ECO pilot phases.

Section B: Understanding the Common Dishes prepared in Electrical Appliances (Comparing Follow Up survey and cooking diaries)

The Section A indicates the change in use of electrical appliances from the ECO pilot phase. In this section we dwell on how the electrical appliances are currently being used comparing the information from follow up survey data with the cooking diaries.

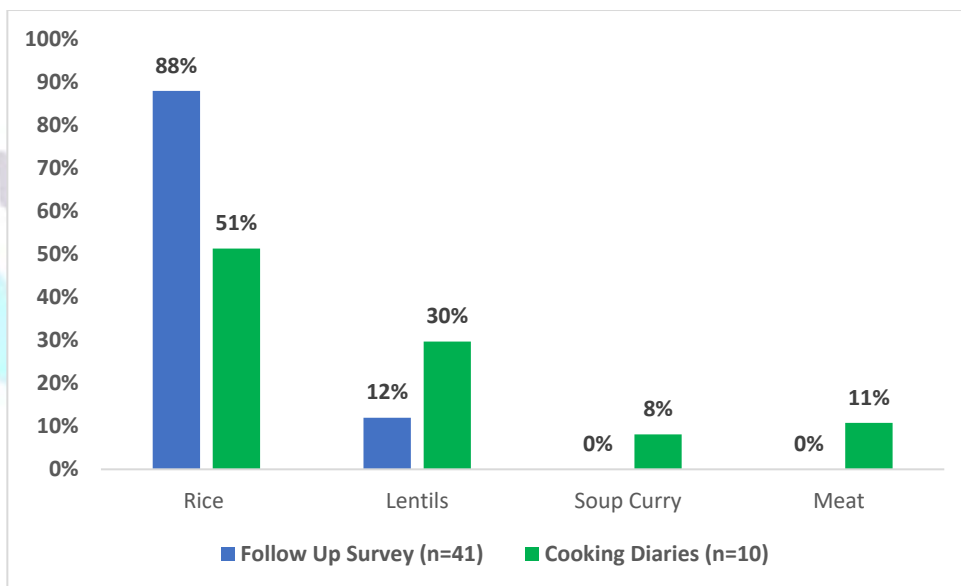


Figure 17: Percentage of Dishes Cooked in EPC

The cooking events from the cooking diaries suggests 5 dishes (rice, lentils, soup/curry, meat and boiling milk) are being prepared using electrical appliances. Cooking diaries indicate rice are cooked lesser than stated in household survey whereas lentils are being cooked more than stated in household survey.

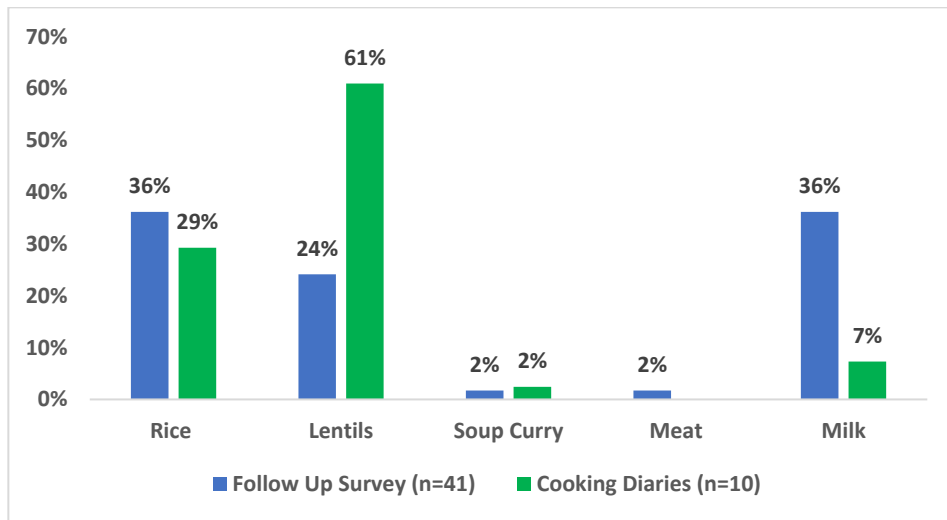


Figure 18: Percentage of Dishes Cooked in Induction

Section C: Comparison of Water Heating by Electrical Appliance with ECO Pilot Phases.

Apart from cooking general dishes, the cooking appliances and fuels were also used to boil the water for various purposes (making tea, washing, shower etc). The comparison of appliance used in water heating from current follow up cooking diary is made with ECO pilot phases which indicates the share of electrical appliances (primarily Induction stoves) has increased compared to the transition and endline phase of ECO pilot study. The use of Biogas either for water heating or in general as a cooking fuel have been replaced by other fuels.

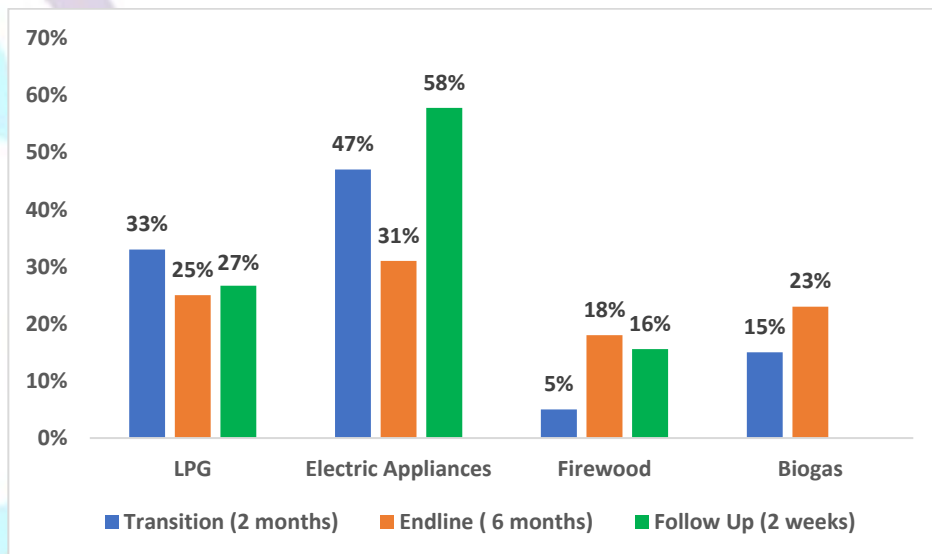


Figure 19: Appliances Usage in Water Heating Events (Cooking Diaries data n=10)

4.5 Changes in Cooking Practices and Perception

4.5.1 Practices

Family member participation in cooking: When asked if there has been changes in who does cooking since the end of pilot Study, 82% stated there have been no changes. The baseline study during ECO Pilot suggested in 78% households, female was the primary cook. During the ECO pilot endline/ECO exit survey, around 32% participants stated that the male spouse in the family were more interested to use or are using the electrical appliances and around 36% stated that other family members especially their son or daughter started cooking in the electrical appliance during the pilot study phase. When the participants were quizzed in the Follow up study with the similar questions, we could see the interest from the male spouse or cooking by male members has increased significantly to 58% of household. The cooking interest or cooking engagement from son or daughter or elder members in the family has also slightly increased to 38% after the end of pilot study. The interest from other family members in using Induction Stove is much higher than EPC, around 56% of Induction Stove user participants answered that the Induction Stoves are used by other family members (other than them) compared to 22% EPC users.

Preferences for Electric Cooking: When asked during household survey what they liked and disliked about electrical cooking. As shown in Figure 20 a: Likes about ECA Figure
half of the ECO follow up participants felt that the ECA are easy and safer to use while 28% ECO follow up participants enjoyed being able to do multitasking due to automation features in the ECAs. Taste of the food was mentioned by mere 8% ECO follow up participants and 14% ECO follow up participants liked ECAs as they contributed to reducing smoke in the kitchen while contribute to maintaining cleanliness and avoid thick black mark on the utensils.

In contrast, ECO follow up participants had responded regarding their dislikes about the ECAs. Almost equal percentage of ECO follow up participants mentioned about taking long time to cook in ECAs (24%), difficulty in stir frying vegetables (22%) and unscheduled loadshedding or power cuts (20%) as major reason for disliking ECAs. 17% ECO follow up participants found requirement of additional utensil for cooking as hassle associated with ECA. Some ECO follow up participants (17%) that did not had any reason to dislike ECAs.

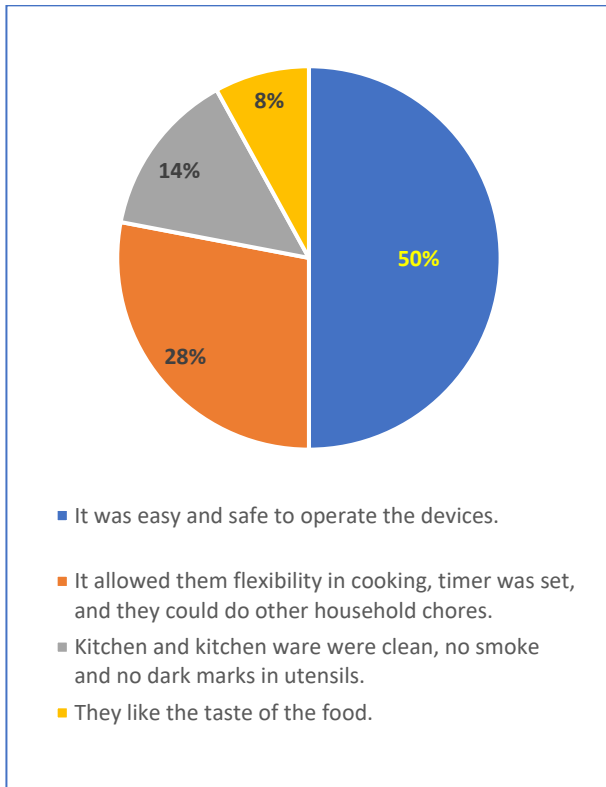


Figure 20 a: Likes about ECA

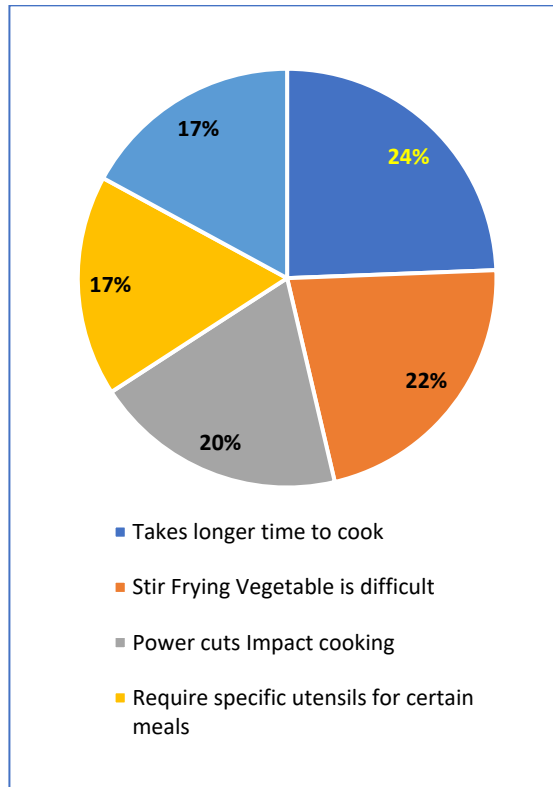


Figure 20 b: Dislikes about ECA

The participants also feel utensils used in ECAs are much easier to clean (over 92%) where only one (1) participant disagreed. However, the participants informed that the non-sticky portion of the EPC wore out with repeated cleaning so now meals (especially rice) stick on the bottom during the focus group discussions.

Impact due to Electric Supply: 80% of participants informed there has been power outage incidence in their electrical supply after the ECO pilot phase. 58% of them stated the power outage occurs few times in a week while 20% stated the outage occurs few times in a month. 37% of participants stated these outages last only for few minutes but another 44% stated it last around 2 hours or less at once. Among the participants who have experienced the power outage around 87% stated the outage affects their use of ECAs where almost all switched to LPG for remainder of the cooking.

Regarding voltage fluctuation in the electrical supply system, 40% mentioned they have experienced fluctuation in voltage. All the respondents who have experienced fluctuation stated such changes have neither impacted their cooking nor imparted any damages to appliances or household electrical systems, indicating improvement in electrical supply and safety. “The CREE chairperson in FGD informed, during the ECO pilot the energy audit of the CREE and locality was conducted, based on the recommendations from ECO Pilot team, the supply system, alignment of distribution and transformer capacity was updated”.

4.5.2 Cooking Perceptions

Few participants had awareness on the electrical cooking appliances or used it before the ECO Pilot study. The ECO Pilot study employed the strategy of collecting the interest from the households from the three study villages. During the initial interest collection, the aspiring participants were informed the project shall subsidise the electricity bill for certain duration of the project period while the first month bill shall be entirely paid by the project. The participants of the FGD shared that during the interest collection phase; the entire village had discussions on the project. Majority of them and fellow villagers had a perception that the cooking in electricity is very expensive and unsafe. The ECO Pilot project has been successful in debunking two major outdated perceptions in the among the participants. During the household surveys and FGD, the participants informed the increase in electrical bills after introduction of electric cooking are less than they initially expected. The increment in monthly electrical bills is in average of 200 NPR (1.25 £) per month. Few households had over 500 NPR (3.125£) per month, but they informed they also had bought other electrical appliances such as refrigerator, electric kettles, and television. Almost all the participants of FGD stated they felt the price of cooking in electrical appliance is cheaper compared to the LPG gas where an average LPG (which cost 1800 NPR/11.25 £) last around 3 months equating 600 NPR (3.75 £) per month.

Electric Cooking is Expensive?

Dhana Maya Shrestha of Mangaltar, filled the Expression of Interest to participate in the ECO-Pilot study with discussion with her husband and other family members. Since, ECO-Pilot was widely discussed among the villagers at the time, when her neighbours discovered she has made such decision, warned her that the electricity bills will be very high. “The project will only subsidise electrical bills for certain time; how will you sustain after the project completion” they remarked. She decided to go against the advice. The electricity bill since has a minor rise (she quoted 150-200 NPR per month). With rising cost of chief fuel in the area, LPG, after Ukraine situation, the use of LPG was significantly costly than her bills from Induction Stove and EPC. She also states her neighbours regretted having decided against the participation in the project.

The second outdated perception was on the safety of the equipment, the idea that appliances are unsafe was prevalent during the start of the study. We could not elaborate if there was any safety incident during the pilot phase, but the current household survey suggested three (3) peculiar cases with the users, where user experienced electric shock while using the appliance. Some of the respondent also mentioned a vibratory sound from the Induction Stove during the survey. These events were discussed during the FGD, where participants who experienced the electric shock or noise problem were asked to elaborate. The participants explained when Induction Stoves were touched by wet hands, they experience slight electric shock but none with dry hands. Almost all the FGD participants were on

consensus that their perception towards electric cooking being safe has changed positively with their experience of ECAs during and after the ECO Pilot study.

Electric Cooking is Unsafe?

Shova Subedi of Mangaltar, during the FGD complained on the constant noise from her induction cookstove. She stated the sound are persistent and irritating at times. To her revelation, the other participants were quick to advise her that such noise occurs when there are drops of any liquid over and beneath the induction surface. They also stated they use to experience the similar noise in their appliance, once they realised it was the external material causing such noise, they tend to clean the Induction before and after every use.



4.6 Addition of Electrical Cooking Appliances

Buying Electrical Cooking Appliances: The appliances from the ECO Pilot study were distributed to the participants as a part of study at free of cost. The endline phase and exit survey suggest that the ECO participants did not buy any additional ECAs. During the follow up survey and FGD, it was mentioned by the participants that after the commencement of pilot study, some of the equipment's suffered technical issues. Altogether seven (7) participants had such problems (Six with Induction Stoves and one with EPC), where four (4) participants mentioned their equipment couldn't be repaired and is non-functional.

In such scenario, the survey and FGD also focussed on whether household have replaced/added new ECAs and have intention to do so. The follow up survey indicated four (4) out of forty-one (41) participants bought new appliances (3) Induction Stoves and one EPC). One participant (out of initially damaged 4) replaced her Induction Stove provided by the project as it couldn't be repaired, others wanted to have additional ECAs (one who had only been provided with EPC bought Induction and another vice versa).

During the FGD, the participants in general expressed the existing ECAs are sufficient for their cooking needs for their reason of not buying additional ECAs. The participants whose equipment were non-functional and have not replaced them, responded that "although the cost of using the appliance is cheap, they are easy to operate and cooking is simple, the lack of proper repair arrangement and spare parts availability, they decided against replacement".

When asked of the interest to buy such equipment in future, majority of participants of FGD were enthusiastically positive, some mentioned they shall replace the same equipment if they go non-functional in future. This enthusiasm echoes the ECO pilot exit survey where around 97% of the participants had expressed their interest to buy the equipment in future. However, the follow up survey suggested over 65% of participants were not interested to buy the ECAs. The 34% whose expressed their interest to buy, Induction Stove was chosen by 65 % while remaining wanted to buy ECA. Almost all the participants mentioned the cost of equipment and lack of after sale services hindered their decision or interest on buying ECAs.

Opportunities and Challenges to Purchase Electrical Cooking Appliances:

After the initial review of the follow up data, where the majority of user (participants of ECO- Pilot study) stated they were not interested in buying or adding ECAs, an FGD with participants, CREE member and local distributors was carried out to further articulate on the lack of interest.

Although all the stakeholders (participants, electrical supplier, CREE, distributors) perceive electric cooking are eco-friendly, cheap, easy to use and has potential for business, they point the lack of

appropriate repair services and difficulty on availability of spare parts are behind the non-interest from the households.

One of the ECO Pilot participants, Saroj Shrestha informed “his family received Induction and EPC as part of ECO Pilot study, after few months of ECO pilot commencement both ECAs were damaged. The assigned repair technician (trained in repair and maintenance) was unable to repair them. He mentioned they lacked the proper tools to carry such repair. His family has then switched primarily to LPGs for cooking. He travelled to Banepa (around 44 Km), the largest market of district, but could not locate any repair shops who specialised on this kind of equipment”.

There are two suppliers in the area who sell ECAs of CG and Prizma brand. They stated any major repair of the equipment usually takes up to 2-3 months, causing dissatisfaction from the customer base. The only repair shop is available in Banepa and in case they require any spare parts, they must contact the dealers in Kathmandu.

The functioning members of the CREE stated that the repair and maintenance trainings should have been provided along with the distribution of equipment to number of people in the area. The CREE head mentions “If there are capable human resource able to repair and maintain e-cookstoves, the local inhabitants would have had sense of security while buying and using them”.

In follow up survey, the household also indicated the need of upfront high investment compared to their financial stature is one of the reasons they are not interested in adding or replacing the broken ECAs.

As seen evident from the study lack of the after sales services in the area, difficulty in accessing information on after sales/repair and high upfront cost might lead to the situation where after the end of life of the ECAs distributed by ECO Pilot study, the household will switch back to their old ways of using LPG and firewood for cooking.

4.7 Effect of Reduction in Support Mechanism after Pilot Project

The ECO Pilot study was an intensive exercise where the participating households were trained in using the appliances, engaged in cooking diary exercise where they recorded their use of appliance, meals cooked daily etc and used to engage with enumerators (locally based) in daily basis. During the FGD with ECA users, the participants listed what they perceived as the support from the ECO Pilot study was as:

- Providing Appliances
- Training in Use of ECAs
- Information on or providing Repair and Maintenance

The participants felt the biggest impact on reduction of support mechanism after ECO Pilot study was in lack of information on repair and maintenance of the appliances. The exit survey also indicates there was no major case of repair or accident occurred during the pilot implementation phase. Seven (7) participants responded they had technical glitches to their appliances after ECO Pilot phase:

- Two (2) of which contacted the enumerator (employed during Pilot study) for information on repair, they were directed to the local technician.
- One (1) directly took it to local technician,
- Two (2) did not know what to do and whom to contact, left the system unrepaired and has not been in use since.
- One (1) decided to contact the official distributor in Banepa.
- One (1) mentioned, they tried contacting the past project officials.

There have been also minor cases of repairs which the participants took support from local technician, but it took significant time as they believe the local technician lacked the overall repair knowledge and lack of spare parts, tools available to them.

When asked “What would they want to change in ECO Pilot Study if they could go back in time” during the FGD, there was consensus among the participants that they would have devise a support system, even after the pilot phase completion, on repair and maintenance of the appliance. They mentioned the local technician trained on the appliance was provided with basic repair training. They could not cope with the major issues, they also think as the technology is new, a detailed module in maintenance should have been developed. Many of the participants felt the project could have provided information on whom and where to contact in case of major repair and change of parts.

4.8 Emerging Opportunities and Challenges on Adoption and Use of ECAs

4.8.1 Opportunities

The electric cooking in Nepal has largely focused in the urban area, provided that the event of power cuts has significantly dropped, and capacity of distribution has been improved in last few years. But the outcome of this research suggests the pilot study have been successful in initiating a demand in rural areas of the country too. This will be helpful in converting large rural population from firewood and LPG based cookstove to much cleaner fuel, provided the electrical and market system are supportive. Following evidence throw lights on the scale of opportunities for electric cooking in rural areas,

Evidence 1: All the participants of the ECO Pilot study were introduced to the electric cooking by the projects. Some participants mentioned they were aware of the system but have never used them before. The follow up survey and FGD suggested, apart from few repair cases, the participants are satisfied with their devices. The follow up survey indicates around 83% of ECO participants have recommended the use of the ECAs to other, the remaining stated nobody in their neighbourhood enquired so far. Easier to use (listed by 80%), Saves time (listed by 44%), Saves money (listed by 42%) and Safety (listed by 7%) were chief reason for their recommendations.

Evidence 2: The experience of the participants and the word of mouth have also created a positive perception in the community. Around 82% of non-participants feel they are not many challenges for them to switch into electric cooking, the remaining 18% mentioned they are not aware on how to use them, perceive it is expensive and unsafe which are hindering for them into use of ECAs. Among the respondent (18%) who think there are still challenges for adoption for electric cooking, over 60% of them think it can be overcome through awareness and around 10% believe lower the electrical rates shall increase the use of ECAs.

Evidence 3: Market Activation project was initiated by Practical Action in the neighbourhood after ECO Pilot study. The two local ECAs suppliers of the market activation project can sell around 170 ECAs in the ECO Pilot study area. They mentioned the enquiries for EPC are generally higher, as it is used to cook rice (most common staple of Nepali meal). They also mentioned the demonstration from ECO Pilot study has created awareness and changed the perception towards electric cooking which has helped so such high uptake and new deployment of ECAs in the area.

4.8.2 Challenges

The upscaling ambition for electric cooking in areas like Mangaltar, Pinthali and Ramche are met with several challenges as indicated by various sections of this study as:

Electrical Supply and its Quality: Around 80% of ECO participants mentioned there are power outage few times of week in their area while 44% stated these outages last to few hours (2 hours or less). Whenever there is a power outage, they switch to the LPG to continue their cooking.

Widespread Unavailability of After sales Services: Among 7 cases of need of repair to the participant's ECAs, 4 of them were either damaged beyond repair or household couldn't locate the support services for the repair and maintenance.

High Upfront Cost: Although the participants mentioned the increase in average electrical bill is very low, their experience with electric cooking is mostly positive and their perception towards has changed. But they are sceptic on buying additional or replacing the current one with another (as discussed in section 4.6) as they think their finances will not be able to cover the high upfront equipment cost.

Household Electrical System: The ECAs supplier and distributors mentioned that because of power sockets and poor quality of wiring in the household, the local distributors have been replacing or repairing such system, which has added to additional cost to the households.

What could ECO Pilot study could have done differently?

- The project could have devised a support system, even after the pilot phase completion, on repair and maintenance of the appliance.
- The local technician trained on repair and maintenance could not cope with the major issues with the devices, as the technology is new, a detailed module in maintenance should have been developed.
- Pamphlets or brochures (in local language) indicating technology, basic operation guidance's, information on suppliers, information on whom and where to contact in case of major repair and change of parts could have eradicated many issues with the participants on use, repair and maintenance of the equipment and minimised the health and safety incidents.
- At least in the pilot research area, on the project, its objectives, limitations so that expectations among the people can be kept minimum and thus shall not hamper any private led supply or sales in future.

5. Non-Eco Participants Survey Findings and Discussion

5.1 Introduction

50 participants, 39 women and 11 men were interviewed via a structured questionnaire, were not part of the original ECO Pilot study but live close to the participants in Mangaltar, Ramche and Pinthali. Among the non-participants respondents 58% have both, indoor and outdoor kitchens, 30% have only indoor and remaining 12% have only outdoor kitchen. The respondents informed that the outdoor kitchen is usually for firewood-based cooking and indoors are for LPG, Biogas and electrical cookstoves. The objective behind the non-participants survey was to:

- Understand the impact of ECO Pilot project in the cooking practices and perception in the locality.
- What has been longer term impact of ECO Pilot project in electrical cooking market services in the area.

5.2 Impact on Cooking Practices and Perception.

5.2.1 Cooking Practices

The baseline data from the ECO Pilot study reveals the neighbourhood were not using any ECAs before pilot study and LPG was chief fuel followed by firewood and biogas (Figure 21).

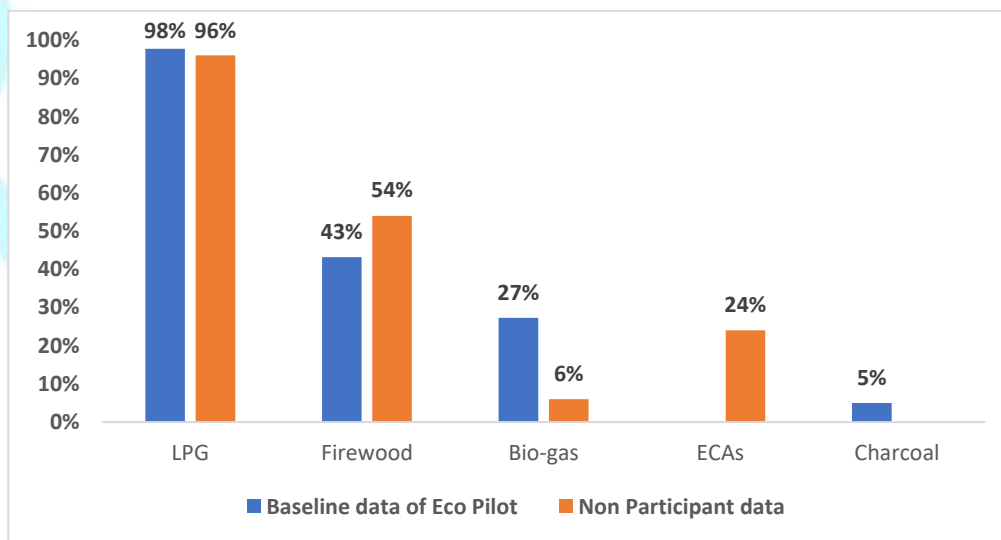


Figure 21: Non-Participants Cooking Fuel Usage compared to ECO Pilot Baseline Data

After the completion of ECO Pilot study, around 24% of the non-participants have purchased and using ECAs, among which Induction Stove dominates the purchase (over 92%) followed by EPC. LPG still dominates the as chief fuel source, where ECAs seems to have replaced the use of Charcoal and Biogas in the area.

The current fuel sources are used to prepare meal and foods in a frequency of two (2) times a day by over 58% of households, while 36% of them use it three (3) times a day and only 6% of them use these sources over three (3) times a day. These households have an average family of 3-4 persons, the women do most of the cooking compared to men.

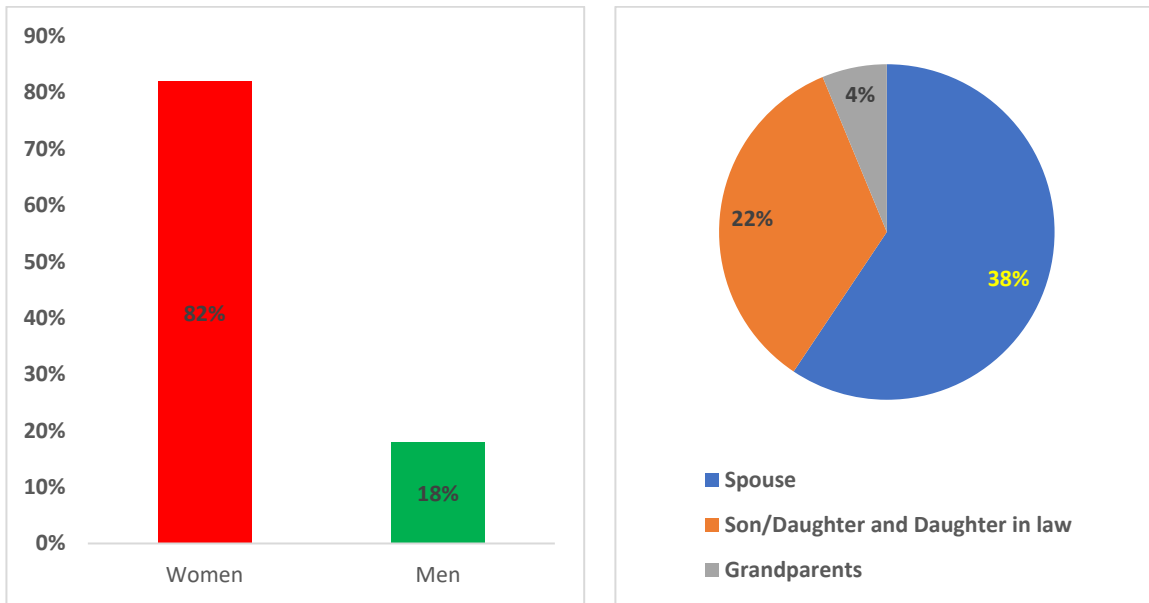


Figure 22: Primary and Secondary Cook

The fuel sources quoted by the non-participants when analysed based on the frequency of their individual usage also suggest the high use of the LPG followed by firewood.

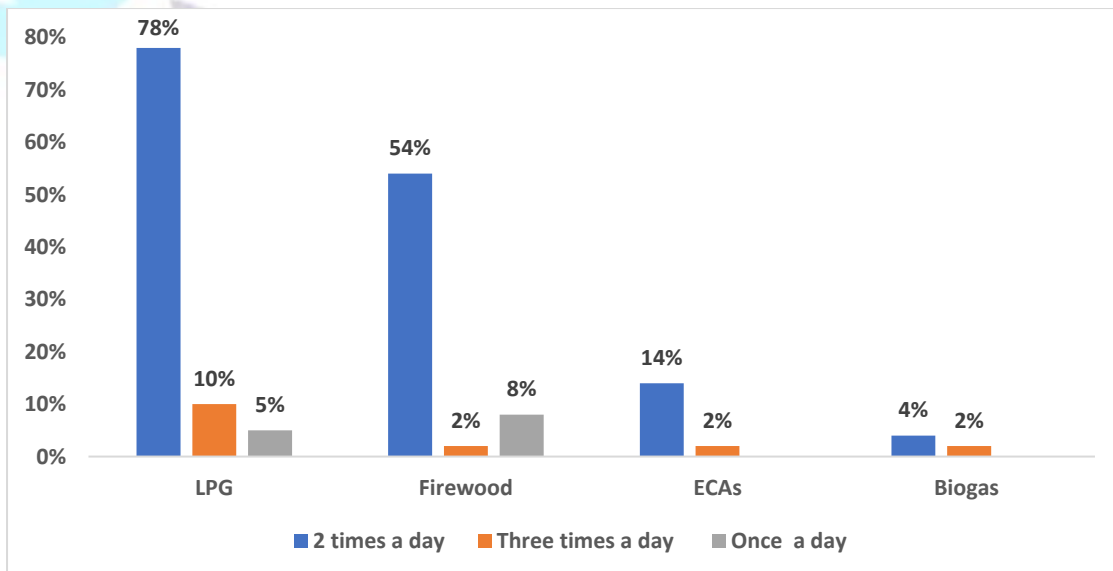


Figure 23: Existing Cooking Fuel Frequency of Use/Day.

As stated earlier, the highest frequency of cooking among the non-participants is twice per day which is mostly undertaken using LPG followed by firewood. We also see the ECAs shares being in the mixed of cooking while Biogas shares are very minimal.

When we compare the data from the non-participant survey on the frequency of use of various cooking appliance and compare them with the baseline data of ECO Pilot study (the baseline phase is like non-participant's as in both the case, project has not made any direct intervention) (Figure 24).

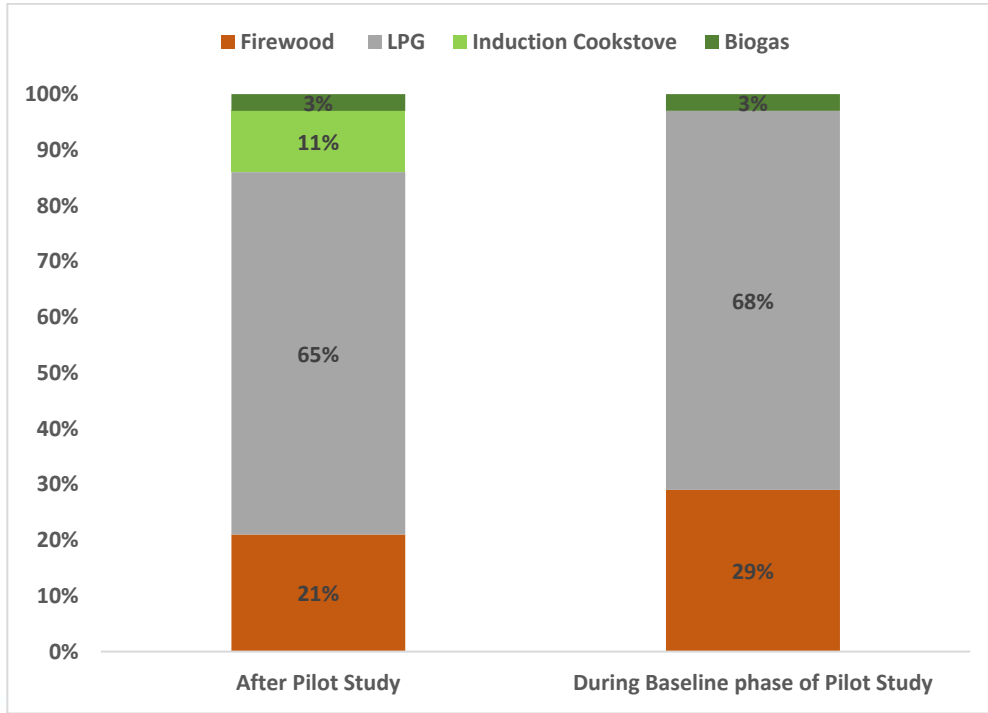


Figure 24: Existing Cooking Fuel Frequency Versus Baseline before ECO Pilot Frequency of Use.

We can see a decline in use of firewood and LPG which has been replaced by use of Induction Stoves among the non-participant household of ECO Pilot study. It indicates the increased penetration of electric cooking even with the non-participants of Pilot study.

ECONOMICS OF COOKING AMONG NON PARTICIPANTS

- Average households are spending around 1950 NPR (12.5£) on one LPG cylinder. They stated they a cylinder last for a month (by 50%), two months (28%), three months (14%) and for rest it lasts over 3 months (8%).
- The consumption of firewood by households are as, 14% of households consume around 50 Kg of firewood while 12% consume 30 Kg and 8% 20 Kg respectively in a month. Almost all the household do not buy but fetch the firewood in nearby vegetations.
- The average electrical bills per month of the households is approximately 350 NPR (2.25£) with 100 NPR (0.65£) being the least and 2500 NPR (16£) being the highest among the non-participants.

5.2.2 Cooking Perceptions

Figure 25.a shows the perceptions of electric cooking among non-participants - 46% had tasted food/meal cooked in electrical cooking appliances. Perceptions are mostly positive. When asked about their perception on electric cooking most of the non-participants had neutral perception regarding better taste of food cooked in ECAs (52%) and safety issue in cooking with electricity (58%). There were mixed opinions on the cost of cooking, although most (38%) felt it was expensive. However, most disagreed that it is difficult cooking with electricity (44%) and 8% strongly disagreed. It can be inferred that people perceive cooking with electricity and ECA is something that they can do without much hassle.

Non-participants who owned ECAs had more positive opinions (Figure 25b). The majority (59%) disagreed that cooking with electricity is expensive and the vast majority disagreed that eCooking was difficult (92%). There were mixed opinions regarding the food tasting better when cooking using electricity and safety associated with electric cooking.

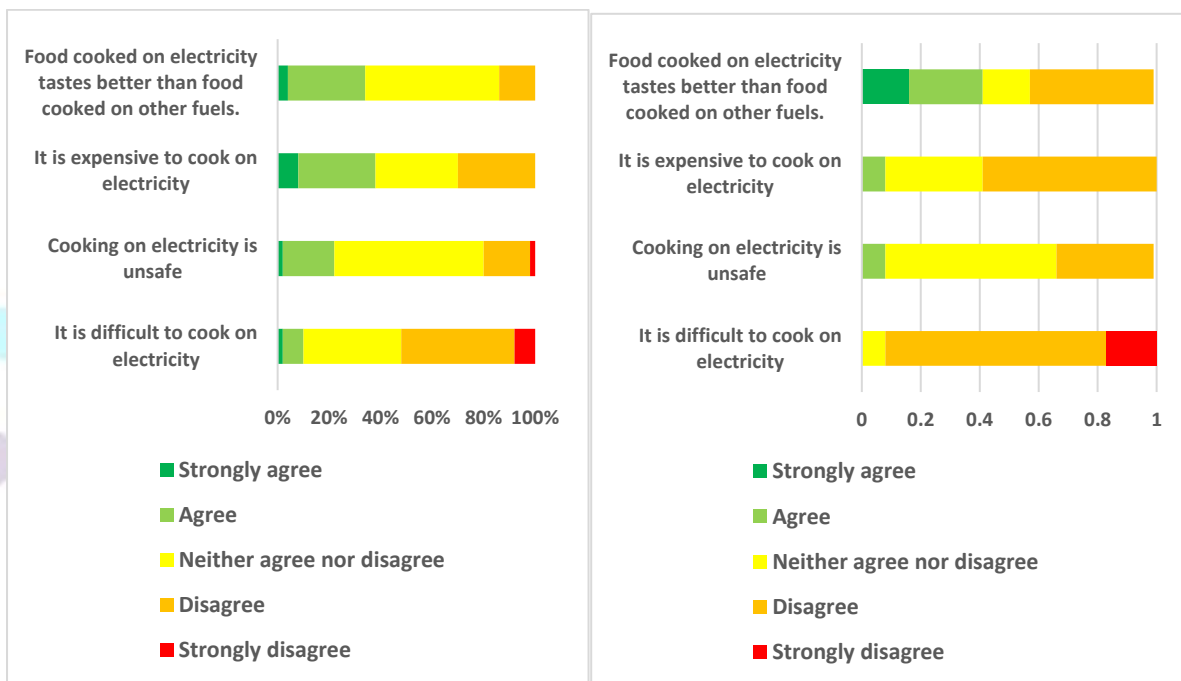


Figure 25 a: Perception of Electric Cooking among Non-participants. Figure 25 b: Perception of ECAs Users among Non-participants.

Isolated Generic Comparison:

- Majority of them stated “they feel cooking in ECAs are easy” which resonates with the above table where more than 50% household feel cooking in ECAs are easy.
- The non-participants perception on safety while using ECAs is mixed and inconclusive, more than 20% feel it is safe while another 20% feel it is unsafe and majority are undecided.
- In general, they feel the food prepared in ECAs taste better.

Focusing only User’s: as indicated from Figure 25.a and 25.b, the perception among the non-participants owning ECAs is much higher to the overall perception among the non-participants.

Comparing with ECO Participant’s Perceptions: the participant’s perception towards ECAs has been mostly positive, the non-participants were sceptic towards the safety in cooking with electrical appliances which none of the ECO participants perceived. Whereas the non-participants also have positive views on running cost of appliances, ECAs being easy to use and towards meal prepared in them.

When the non-participants asked if their opinion towards electric cooking has changed over the last year, around 44% has positive change in opinion towards electric cooking while remaining were non-opinionated. Figure 26 highlights the reasons behind the change of opinion, with their own use of ECAs the main factor.

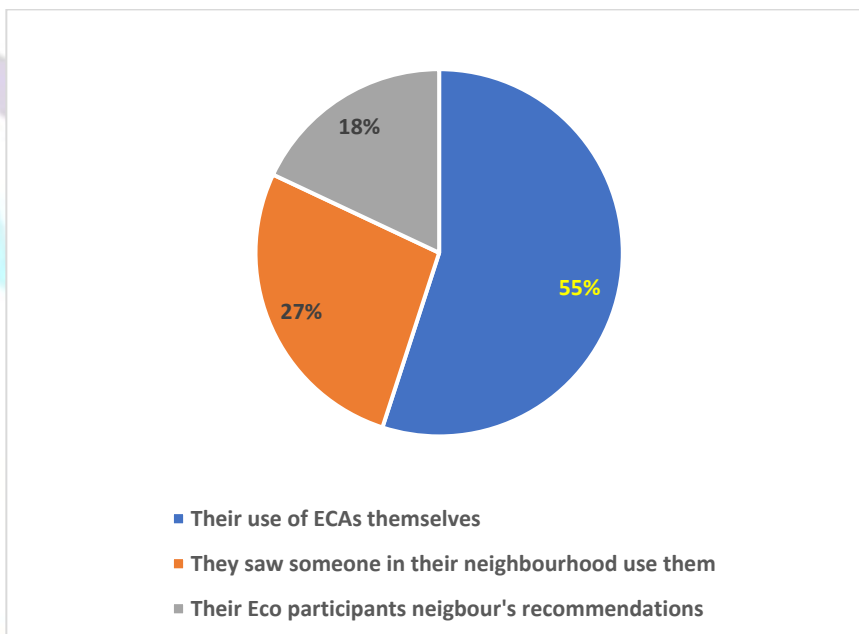


Figure 26: Reasons for Positive Changes in Perception

Has Eco Project Imparted these Changes in Perception? Before analysing if or not ECO Pilot study has brought changes in perception in locality (around 44% of positive changes in perception among the non-participants), we first tried to understand if there were any other factors or agencies which influenced to shape their views towards electric cooking. Figure 27 shows who the non-participants informed they have/had discussed about electric cooking with:

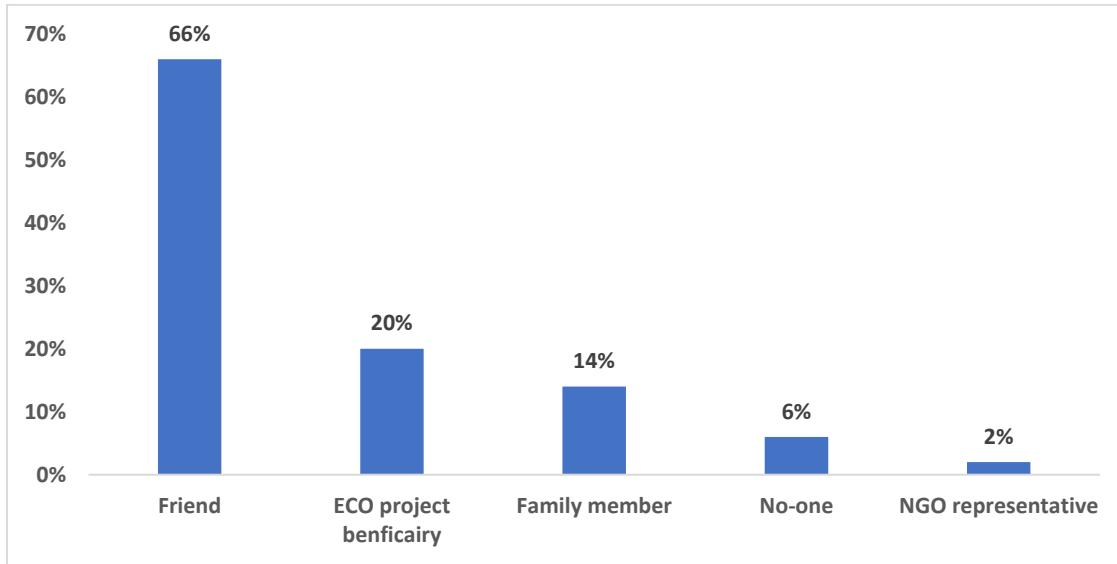


Figure 27: Non-Participants Discussed Electric Cooking

- Non-participants stated the friends, family member, ECO participants and NGO are locally based.
- Over 81% of the friends recommended the use of electric cooking while only 6% against.
- All the ECO participants when discussed, recommended the use of ECAs.
- 43% of the family member recommended while remaining advised against the ECAs.
- Only one (1) non-participant stated they discussed with a local NGO's representative who recommended the use.

Figure 28 suggests having Electric Cooking discussions with different stakeholders influences their decision to in their adoption and use. The opinion and recommendation from each stakeholder influenced at least 70% of the non-participants. Proportionally, ECO participants were more influencing to the non-participants followed by friend and then other family members. Although the NGO's influence seems higher, but it is only based on One (1) response, is deemed inconclusive.

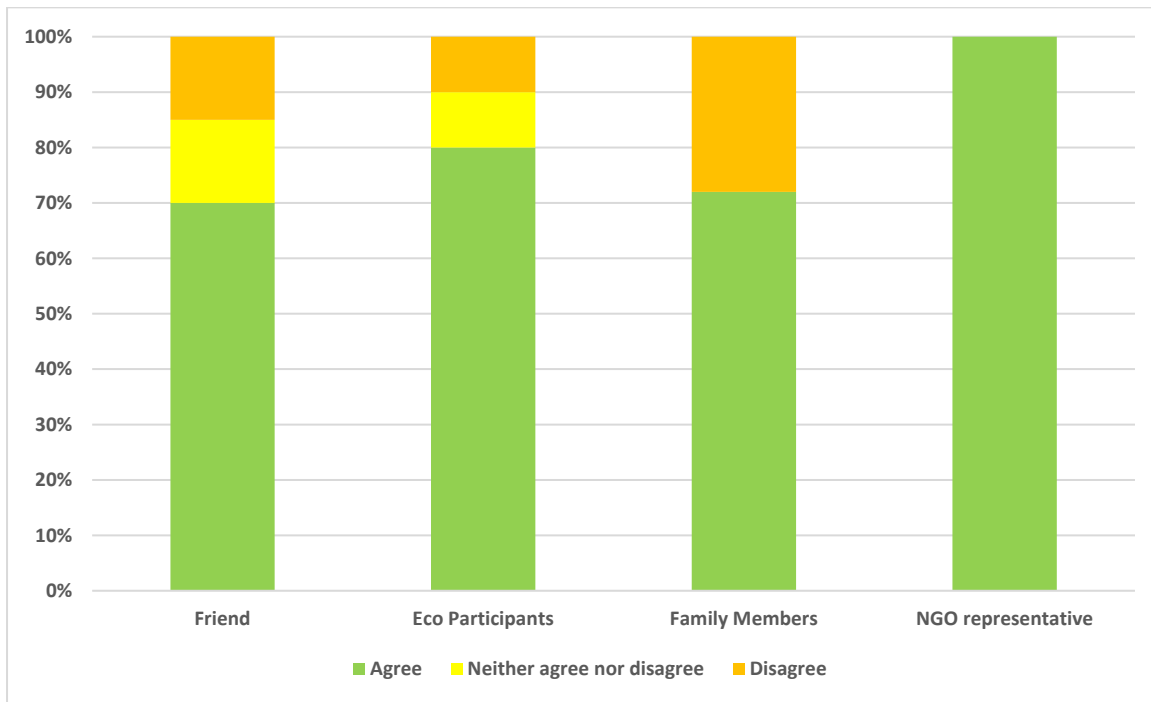


Figure 28: Stakeholders that Influenced Interest in Electric Cooking among Non-participants

ECO project or participants could have influenced in changing perception and practices among non-participants, we analysed the responses of households if they were aware of ECO Pilot study or not, to determine the pattern of impact. Surprisingly only 28% of the non-participants stated they have heard or are aware of ECO Pilot study. During ECO Pilot study, an awareness/sensitization program was organised in each of the villages, expression of interest to be part of project was collected from most of households, these villages have similar demography, households in the villages are located very close to each other and these non-participants respondent are the neighbours of earlier ECO participants. So, the responses from majority of non-participants being unaware of the pilot studies was unusual. This was discussed during the FGD with ECO Pilot study participants, where the pilot participants quoted “ECO project is perceived as the one who provided “Free” ECAs to limited number of households, although many households were sceptic in adopting ECAs at beginning, their negative perception has changed over the period of project and they feel as a missed opportunity, hence the statement of being unaware of the pilot study”. This statement is further lamented, when the non-participants were asked (28% who stated they are aware of the project) what have they heard about the pilot project, almost all responded, “it is the project that provided ECAs for free”.

However, the further micro analysis was undertaken segregating the non-participants that were aware of the projects to non-aware and their change in perception. As stated earlier since all the non-participants stated their cooking practices has not changed after pilot study, we were unable to draw similar analysis among aware and non-aware to analyse their changes in cooking practices.

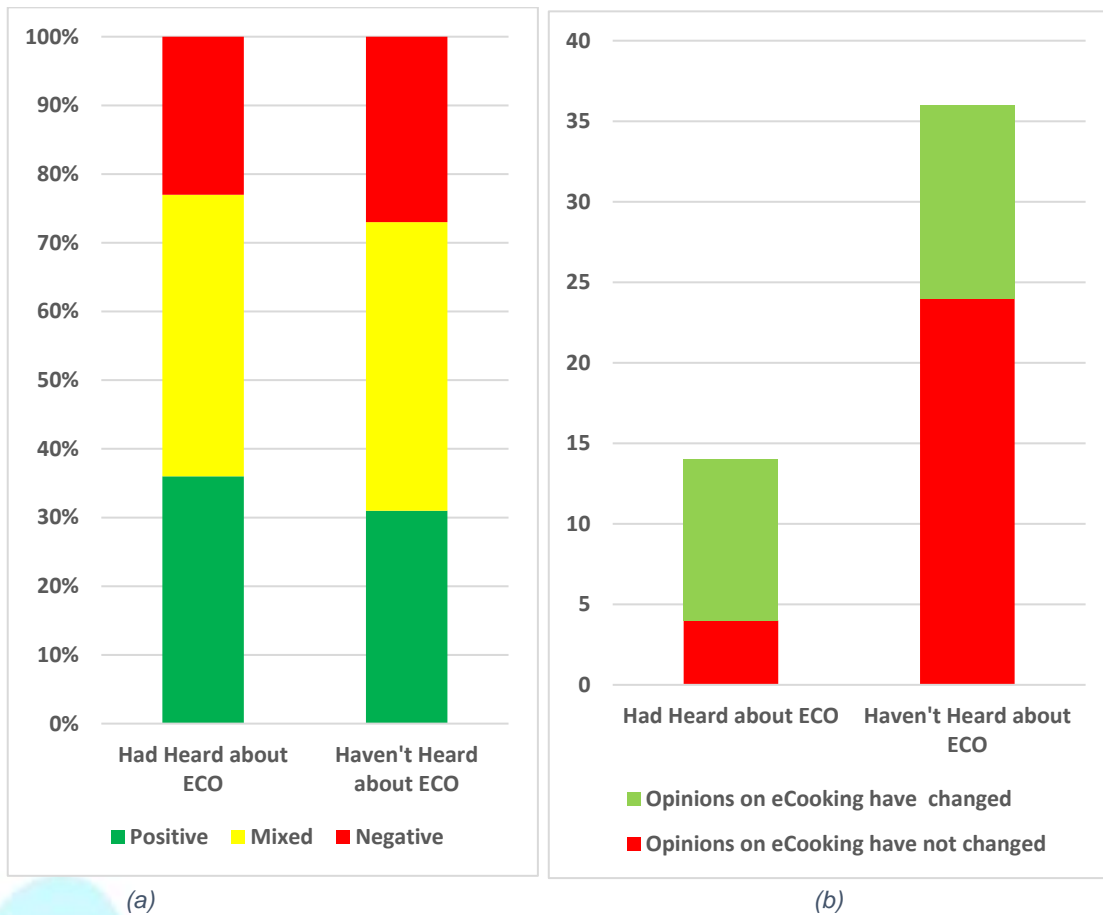


Figure 29: (a) Opinions among the non-participants and (b) Changes in opinion among non-participants.

Figure 29a shows the non-participants who stated they had not heard of ECO have similar perceptions towards electric cooking to those which said they had heard about the ECO pilot study, with the latter group slightly more positive. When we analysed these positive and negative responses, we clearly see positive responses towards use of ECAs and electrical bills, while food taste garnered mixed responses and the safety of appliances had negative change of opinions on both the group (who have heard and who have not).

When asked to list the name of the ECO participants, only one ECO participants were listed by 4 non-participants (among 14 responses). All of them stated “she” recommended the electric cooking as it is very easy to use to which only 2 non-participant’s interest to buy ECAs was influenced. Since, the responses on awareness of the ECO Pilot project were very low, it is highly inconclusive to point a leader/champion on the electric cooking in the area. However, during the ECO participants FGD, most of the participants informed they constantly seek help and opinion of the local ECO Pilot enumerators (also enumerators for this follow up study). Almost all the ECO participants have recommended the use of ECAs stating electric cooking is easy and safe to use.

5.3 Non-participants Adoption of ECAs and Interest

As stated earlier, around 24% (12 responses) of the non-participants bought the ECAs after the pilot study period (11 Induction Stove and one EPC). The reasons of such purchase were (in priority order):

1. They perceived it was easy to use and cook (6 responses)
2. Additional cooking option to LPG (3 responses)
3. They saw such appliances in neighbourhood which tempted for their purchase and use. (3 responses)

(But only 16% of the current users have recommended the use of ECAs to their neighbours)

Around 78% of the responses from non-participants indicated their interest to buy ECAs which is twice the interest expressed by ECO participants against the response to similar query. The interest to buy Induction Stove and EPC were equally distributed, 59% and 62% respectively. The reason for such high interest is (in priority order):

1. They feel such appliances are easy to use.
2. They feel the meal cooked in such appliances are better.
3. They are flexible to use.
4. The kitchen shall be clean (no smoke)
5. They have seen such system in neighbourhood.

The non-participants who showed interest in buying ECAs were also asked why they have not bought the appliance yet; the response of the participants is shown in Figure . 89% of reasons given were cost based: 33% felt ECA being expensive; 38% cited their economic condition not being good enough to enable them to purchase ECA; and 18% were waiting for project being implemented by development agencies with a hope to get ECA for free of cost. 7% participants seemingly had interest to buy but they did not have any idea regarding where to buy the ECA. There were only 5% participants who did not had any interest to buy the ECA.

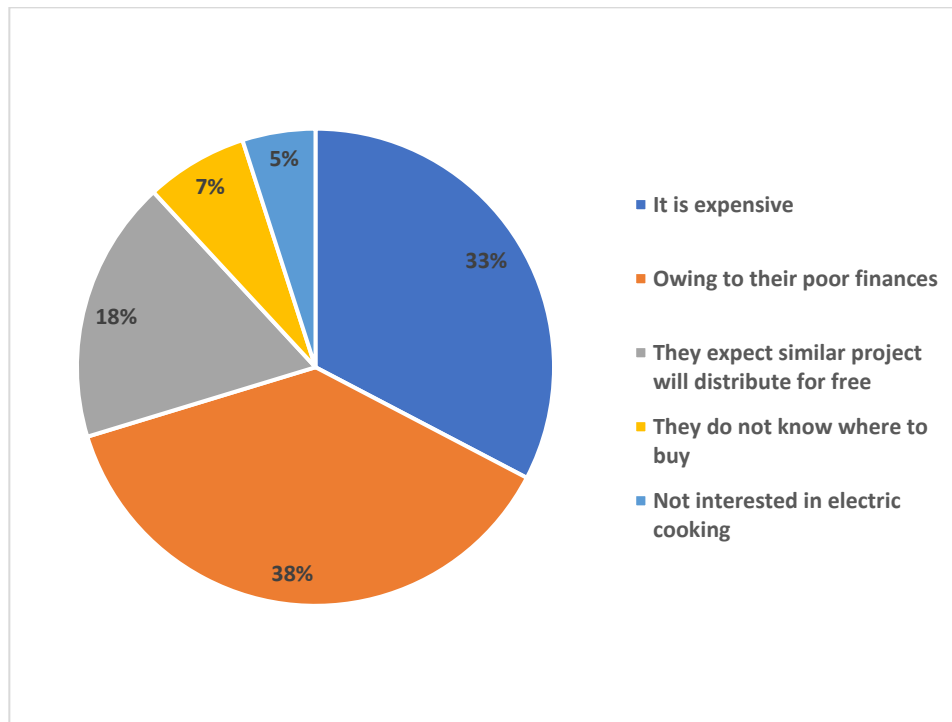


Figure 30: non-participants quoted reasons for non-purchase of ECAs.

The average sums the non-participants were willing to invest in the ECAs was around 2000 NPR (12.8£). An average retail price of the Electric Pressure Cooker (62% of non-participants interested to buy) is in range of 7000-10000 NPR (45-65£) and for induction cookstoves are in range of 3500-5000 NPR (24-32£).



5.4 Opportunities and challenges for Non-participants in Adopting ECAs

Opportunities:

The non-participants who expressed their desired to buy ECAs, favoured Electric Pressure Cooker (EPC), around 62% responses closely followed by Induction Stoves, around 59%. The previous section also dwells on the change in perception with some influence from the ECO participants and their opinion to the non-participants towards electric cooking.

Evidence A: Majority of the non-participants use LPG as the chief source of the energy for cooking. If we compare the ECO baseline data (which is of same locality before any electric cooking intervention), there is a slight decrease in use of LPG whereas usage of Firewood and ECAs has increased in the area. The aftermath of Russia-Ukraine conflict, the prices of LPG have increased in Nepal. This sudden decline of LPG can be articulated as due to increase in prices, so people have reverted to firewood (as stated in section 2.1, the firewood is collected for free). In the FGD, the participants stated the collection and availability of firewood is declining and cumbersome. This presents an excellent environment for ECAs to replace firewood and decrease the dependence over LPG.

Evidence B: From the FGD with the local CREE and evident from household's survey of ECO participants, we see evident that the electrical services and reliability has increased in the area, with addition of new transformers and connecting to nearest possible substation. In Section 4.5.2 we also see average electrical bills per month of the households is approximately 2.25£. Over 50% of non-participants stated they consume one LPG cylinder (12.5£) each month, the difference of 10.25£ (1600 NPR) per month, will allow the potential of integration of ECAs. The household should be made aware the that households with ECAs in the community spend on average an additional 1.25£ per month on electric cooking fuel costs the household have still 9£ of free bill which they could utilise to cover the upfront cost of ECAs (an average induction stoves cost 24-32 £, with 9£ differential savings the cost can be recovered within 3 months period). The reliable supply and cost variance between LPG and ECAs will allow the upscaling in the region and elsewhere.

Evidence C: When compared to Baseline information from original ECO pilot study, the awareness and visibility of the ECAs in the area was very minimal. As stated in section 5.2, around 24% of non-participants currently use ECAs, 46% have tasted food cooked in ECAs and they also showed strong positive perception towards electric cooking features. Additionally, fig.26 also suggests the non-participants opinion have changes positively from the ECO pilot and its participants. This has created a favourable environment for upscaling the ECAs in the area.

Evidence D: Regarding the purchasing preferences and decision making, we can see evident from Fig:31 the non-participants feel they are much obliged and influenced by neighbours and people in their area than their own decision or influence from outsiders. This again present an excellent opportunity to utilise the existing structure, resources and awareness created by the ECO Pilot study, utilising the local enumerators, ECO participants to create awareness and conducive environment of upscaling of the electric cooking appliances among the non-participants.

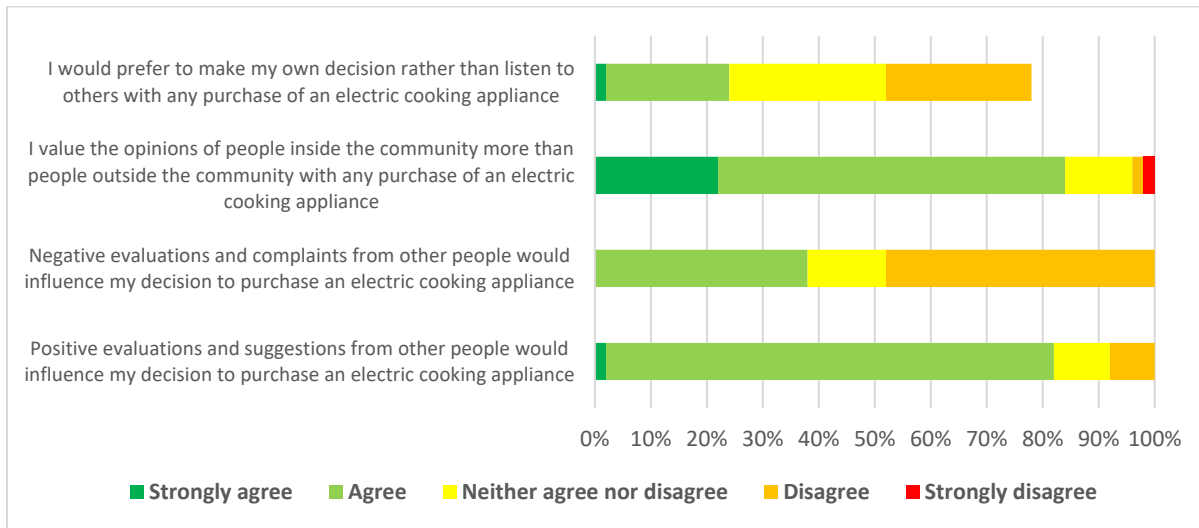


Figure 31: E-cooking Purchasing Preference among Non-participants.

Challenges:

The findings from the non-participants survey, FGDs and KII indicate following prevailing challenges for upscaling e-cooking among non-participants as:

Awareness towards ECAs: As shown in figure 25, around 70% of the people either think cooking in electricity is unsafe or are not aware of it. This indicates the need of awareness among the people on the safety of equipment’s, need of training in handling and usage of technology and information dissemination on the suppliers and most importantly after sales services (also evident from ECO participants survey). Encouragingly, only 7% of non-participants stated they still do not know where the ECAs can be bought (Figure 27).

Willingness to Pay: Although most non-participants showed interest in purchase of electrical cooking appliances, the willingness to invest upfront cost of the technology is very low. The average the households are willing to shell is in around 2,000 NPR (12.8£). An average retail price of the Electric Pressure Cooker (62% of non-participants interested to buy) is in range of 7000-10000 NPR (45-65£) and for induction cookstoves are in range of 3500-5000 NPR (24-32£). The difference in price willing to pay and retail price has a big gap which is hindering the penetration of ECAs in the area.

Differentiating between ECO and Market led supply: ECO project was a noble approach where in a participatory method the household were involved as part of extensive research noting the daily cooking diaries and participating in number of research. To compensate the effort of the household, they were provided with the ECAs. However, the general perception of the pilot study is as quote “Project that gives ECAs for free”, 28% of non-participants who stated they have heard ECO Pilot project made such remarks. Around 18% of non-participants perceive similar project will again provide them with free equipment. This is particularly hampering the ECAs supplier who are working as retailer to sell the equipment in the area, where people perceive the goods will be provided for free.

Overcoming such challenges:

- Utilising the local ECO enumerators or leader among ECO participants as part of awareness creating on safety and usage of ECAs among the participants shall overcome number of prevailing Taboos of the electric cooking.
- Making the household understand, the savings from usage of ECAs compared to LPG present a monthly kitty that makes the switch from LPG to ECAs economically attractive.
- The willingness of pay among the household is low, rather than making household to make upfront investment, a monthly instalment pay over certain period can ease the requirement of high upfront cost.
- With resonating impact of ECO pilot project, it shall be also necessary, at least in the pilot study area, on the project, its objectives, limitations so that expectations among the people can be kept minimum and thus shall not hamper any private led supply or sales.

6. Upscaling of Electric Cooking

The drive of replacing Kerosene cookstoves to LPG in urban and peri-urban gained momentum in late 90's and early 2000's, the change was sudden and in large scale. The kerosene cookstove that was used in 34.7% urban population and 13.7% by overall population in 2001 decreased to 2% in urban and 1% in overall by 2011¹. The sudden change into LPG was compounded with the fact that the kerosene cookstoves were tedious to use, unsafe and the replacing LPG cookstove required low upfront investment, LPG cylinders were subsidised by government as well as LPG were symbol of status quo. In recent years the penetration of LPG into the rural areas of Nepal is very high. The census data of 2001 and 2011 also laments that claim where in 2001 only 4% of rural houses used LPG which increased to above 9% by 2011 (Central Bureau of Statistics). Although the census data of 2021 has not been published but the household data from current survey of participants and non-participants (total 91 samples) also shows over 98% of non-participants and 96% of ECO participants have LPG cookstoves, which indicates the widespread use of LPG in the country.

The LPG replaced the Kerosene cookstoves from urban and firewood stoves from rural areas. The widespread use of LPG is due to:

- The system is easy to use (In participants survey when asked how their cooking with electricity experience was, some of the responses quoted “easy like LPG”)
- The subsidy in the cooking fuel means the operating cost were minimal and within budget of average households.
- The cooking in kerosene and firewood cookstoves induced indoor pollution and cleaning of utensils were cumbersome.

Although the safety in cooking LPG is debatable with number of cases of major accidents each year, the use of LPG as cooking fuel is widespread.

LPG versus ECAs: The high penetration of LPG means large challenge for any alternative means of cooking to provide better services at lower cost compared to LPG. The electric cooking is not a new technology, but its widespread use was hampered by a) Low electricity access in the country, limited to urban and peri urban (around 68% of Household in Nepal had electricity access by 2011, World Bank²) b) the available power supply was severely dampened by power cuts and voltage. The voltage and power cuts situation improved only since 2016. This has accumulated to a negative perception towards electric cooking, where people always keep backup. All the ECO participants (**section 4.6.1**) stated they switched to the LPG when they had power cuts in their area.

¹ Dipti Paudel, Marc Jeuland, Sunil Prasad Lohani, Cooking-energy transition in Nepal: trend review, Clean Energy, Volume 5, Issue 1, March 2021, Pages 1–9, <https://doi.org/10.1093/ce/zkaa022>

² <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=NP>

Can ECAs be Primary Cooking tool?

The overall perception from both the surveys shows mostly positive view towards ECAs. The most misconception on running cost and safety are no longer perceived so (section 4.6.2). With the recent trend of increase in cost of fossil fuel sources, LPG now imparts high running cost compared to ECAs. But the high upfront investment into ECAs and additional buying of associated utensils, lack of after sales services etc have dampened the decision of households to add or buy ECAs (section 4.7). Provided the supporting services such as electric supply are strengthened, electricity unit are low and after sales are available, ECAs will be the primary cooking fuel. But if the supporting infrastructures couldn't be built, additional services are not provided and fossil fuel prices are lower compared to clean supply, ECAs as a primary fuel will be distinct cry.

Upscaling the Electric Cooking, ECO as a Launchpad:

The primary prerequisite to promote and sustain electric cooking is by increasing the reliability of the electrical supply system. The national grid strengthening, upgrading distribution network, using smaller systems (micro and mini hydro) not connected to grid as peaking plants dedicated to cooking only shall increase the availability of supply for electric cooking in all Nepal.

In-line with the ECO Pilot study and follow up data and information, few strategies utilising ECO as launchpad, can be employed to introduce and sustain ECAs as primary cooking option for Nepali households in general.

Strategy 1: ECO Pilot Study Sites as Awareness Tool

ECO pilot study area, Mangaltar, is connected via B.P. highway and had electrical connection via Bhumechuli CREE before the intervention of ECO Pilot project. Section 4.7 shows most participants of ECO Pilot project did not have any awareness on the electric cooking, few have seen them but never have experience of it. The experience of the participants and the word of mouth have also created a positive perception in the community. Around 82% of non-participants feel there are not many challenges for them to switch into electric cooking and around 24% of bought and are using ECAs. The learning, outcomes from pilot study and pilot study sites can be a tool for awareness on electric cooking for rural communities. The pilot sites (from similar pilot in other part of country from ECO) can be utilised for demonstration, used as training facilities and the participants can be utilised as champion campaigner. The positive outlook from the ECO pilot should be properly disseminated to increase the awareness and curiosity among the public.

Strategy 2: ECO in After Sales Services

The household survey and FGD of the participants indicated the major dissatisfaction of the households were on repair and maintenance. The participants also stated the lack of information on the repair shops, availability of spare parts is also one of the reasons hindering their purchase preference of ECAs.

The possible two approach to eradicate the issues of repair and maintenance shall be:

- Development of comprehensive repair and maintenance manual for various types of ECAs.
- Training of ECO beneficiaries or project implementation team including local technicians and enumerators to operate the after sales services.
- Developing various disseminating materials such as brochures, pamphlets that provide generic guide for small repairs, provide details on available local suppliers, spare parts availability and details, details of various ECAs etc. (The brochures or pamphlets can be series of documents with each one of them providing information on various topics also including common health and safety protocol, operation of systems etc)

Strategy 3: ECO Learning Utilised in Building Standards on Electric Supply

The reliable electrical supply and household electrical system shall be conducive in upscaling the electric cooking. They shall increase the household confidence (all the participants have and use LPG whenever there are power cuts in the area, section 4.6.1), the robust household electrical system will also decrease the cases of safety hazards (3 recorded cases of electric shock of the participants, section 4.5.2).

ECO Pilot cases have shown the standards of the electrical supply and it's reliability for promoting and sustaining an electric cooking in rural areas. The pilot project undertook an energy audit of the households and supply system, also made necessary recommendation for required replacement. Those learning shall be populated in form of standard electrical system minimum pre-requirement for households, local CREE or local municipality for future connections so that their systems can be utilised for electric cooking.

7. Conclusions and Recommendations

7.1 Conclusions

7.1.1 ECO Follow Up Study Participants

- 90% of the electrical appliances distributed as part of ECO Pilot study are in functional state, among which around 92% are currently being used by the households.
- The use of the firewood in cooking has increased since the completion of ECO Pilot study. The cooking diary suggests the firewood occupy around 28% of cooking fuel of the participants households which is similar to the share of firewood before intervention from ECO Pilot study (the endline phase of ECO). The follow up survey was conducted during winter, during which many participants stated their firewood consumption increases to provide space heating. This seasonal factor is likely to have contributed to the lower electric cooking use and higher firewood use.
- LPG is still the primary fuel for cooking, around 55% of cooking share (slight increase from endline phase of ECO Pilot). It is also the go to fuel whenever the electrical appliance's user experience power cuts or any problem with the appliances.
- The usage of the electrical appliances has slightly decreased among the ECO Pilot study participants. The follow up survey (with 41 households) shows slight decline (38% in Endline to 34% during this study) whereas 2 weeks cooking diary exercise (with 10 households) shows the electrical appliances has reduced by half compared to Endline phase of Eco Pilot.
- The appliances were predominantly used to cook staple dishes (rice, lentils, curries) showing how the appliances are a good fit for local menus. The array of dishes prepared with electrical appliances has decreased compared to the ECO Pilot study.
- The participation of male in the cooking has increased, during exit survey from ECO Pilot study as around 32% of households indicated that their male spouse in the family were more interested to use or are using the electrical appliances, current survey showed the interest increased to 58%. There is slight increase in use of electrical appliance by other members of family (sons/daughters)- 32% in Exit survey to 38% in follow up survey.
- Electrical appliance's user household perceive; electrical cooking is safe and easy, provide flexibility, kitchen and utensils are clean and they like to food cooked in electricity as their key drivers for using electrical appliances (in priority order).
- Reported dislikes of ECAs in order or frequency were the longer cooking times (compared to cooking with a traditional stove top pressure cooker), difficulties with stir frying or general frying, power cut impacted the cooking, and need of separate utensils with induction stoves which adds to the cost.

- The experience with electric cooking has changed the participants perception that the electric cooking is expensive and is unsafe to use. During the household surveys and FGD, the participants informed the increase in electrical bills after introduction of electric cooking are less than they initially expected. The increment in monthly electrical bills is in average of 200 NPR (1.25 £) per month. With three isolated cases of minor electric shock, the general perception towards safety while using electric appliance were positive among the participants.
- The FGD participants indicated in consensus that they intend to buy additional electrical appliances but improved after sales services and measures to address affordability are likely required. The household surveys show around 65% of participants are unwilling to add or replace (if defunct) electrical appliances in future. Almost all respondent cited the lack of after sales services and high upfront cost for such decision.
- Although the repair and maintenance issues have occurred in low frequency (7 total cases, 3 repaired while 4 damaged beyond repair- total 71 /54 ECAs provided), the lack of skilled manpower for repair and lack of knowledge of repair/after sales facilities is dampening the positive perception of electric cooking among the participants.
- The removal of communication of the project officials with the participants after the ECO pilot studies impacted the participants as they were unable to access the information on repair and maintenance of the appliances.
- The ECO Pilot study and word of mouth from ECO participants has helped in increasing the share of electric cooking in the area. Around 83% of participants have recommended electric cooking in their surrounding areas. The two local ECAs supplier have sold around 170 ECAs in the ECO Pilot study area mentioned “ the demonstration from ECO Pilot Study has created awareness created and changed the perception towards electric cooking” which has supported in their business. As part of their distribution works, these suppliers are also replacing the old/unsupportive household wiring.
- 80% of participants informed there has been power outage incidence in their electrical supply after the ECO Pilot study. 58% of them stated the power outage occurs few times in a week while 20% stated the outage occurs few times in a month. 37% of participants stated these outages last only for few minutes but another 44% stated it last around 2 hours or less at once.

7.1.2 Non-Participants of ECO Follow Up Study

- Over 90% of ECO Pilot non-participants use LPG as chief fuel for cooking, followed by Firewood (around 54%) and Biogas (28%). After the completion of ECO Pilot, around 24% of the non-participants have purchased electric cooking appliances.
- The introduction of electric cooking appliances among the non-participants have increased the frequency of electric cooking slightly decreasing the use of LPG and Firewood for cooking.

- ECAs users and non-users/non-participants of ECO Pilot study, have similar perception towards electric cooking:
 - Majority of them stated “they feel cooking in ECAs are easy” which resonates with the above table where above 50% feel cooking in ECAs are easy.
 - The non-participants perception on safety while using ECAs is mixed and inconclusive, more than 20% feel it is safe while another 20% feel it is unsafe and majority are undecided.
 - In general, they feel the cook prepared in ECAs taste better.
- Around 44% of non-participants have positive changed in their perception towards electric cooking since ECO Pilot Study. Around 80% of (44% who had positive change) non-participants indicated, discussing with ECO participants has helped them with positive perception towards electric cooking. Surprisingly only 28% of non-participants stated they have heard of ECO Pilot study. The non-participants who were aware of ECO pilot studies has more positive outlook towards electric cooking compared to others.
- Among the non-participants who are currently using electric appliances they perceived it is easy to use and cook, they are additional cooking option to LPG, and they saw such appliances in neighbourhood which tempted for their purchase and use as reason for buying ECAs.
- The awareness among the non-participants of ECAs is mixed. While 93% stated they knew where ECAs could be bought, many held outdated perceptions that electric cooking is unsafe (21% of non-participants) and expensive (38%). This indicates the need of awareness among the people on the safety of equipment’s, need of training in handling and usage of technology and information dissemination on the suppliers and most importantly after sales services (also evident from ECO participants survey).
- Although most non-participants showed interest in purchase of electrical cooking appliances, the willingness to invest upfront cost of the technology is very low. The average cost that the households are willing to pay is around 2,000 NPR (12.8£). An average retail price of the Electric Pressure Cooker (62% of non-participants interested to buy) is in range of 7,000-10,000 NPR (45-65£) and for induction cookstoves are in range of 3,500-5,000 NPR (24-32£).
- The local supplier stated as the approach of ECO pilot study providing free equipment’s and incentivising households to encourage the use of ECAs has hampered their current business as ECAs supplier as people expect similar project or government will provide such equipment for free. The general perception of the ECO Pilot study is as quote “Project that gives ECAs for free”, 28% of non-participants who stated they have heard ECO pilot made such remarks while 18% of non-participants perceive similar project will again provide them with free equipment.

7.2 Recommendations

The participants, non-participants survey, cooking diaries, various FGDs as part of this follow up study has indicated towards following bottlenecks in widespread adoption of electric cooking in this pilot site as:

- The quality of the power supply with frequent power cuts.
- The lack of after sales services or information on repair and maintenance.
- The high upfront cost is a big negative for the system deployment especially in the rural communities with low opportunities of income generation.
- Most of the household's electrical system is unsupportive of the electric cooking appliances.
- Awareness among the non-participants towards electric cooking, availability of equipment and services are very low.

To unlock the potential for greater adoption of Electric Cooking, the research findings have identified the following measures through which the ECO Pilot can serve as a launch pad for upscaling electric cooking in and around the study area:

A. Increasing Awareness on Electric Cooking

- Utilising the local ECO enumerators or leader among ECO participants as part of awareness creating on safety and usage of ECAs among the participants shall overcome number of prevailing Taboos of the electric cooking.
- Making the household understand, the savings from usage of ECAs compared to LPG, allows a monthly saving that makes the switch from LPG to ECAs economically attractive.
- The pilot sites (from similar pilot in other part of country from ECO) can be utilised for demonstration, use as training facilities and the participants can be utilised as champion campaigner. The positive outlook from the ECO pilot should be properly disseminated to increase the awareness and curiosity among the public.

B. Strengthening After Sales and Repair Services.

- Development of comprehensive repair and maintenance manual for various types of ECAs.
- Training of ECO beneficiaries or project implementation team including local technicians and enumerators to operate the after sales services.
- Developing various disseminating materials such as brochures, pamphlets that provide generic guide for small repairs, provide details on available local suppliers, spare parts availability and details, details of various ECAs etc. (The brochures or pamphlets can be series of documents with each one of them providing information on various topics also including common health and safety protocol, operation of systems etc)


C. Development of Electrical Supply and Distribution Standards that withstand Electric Cooking Drive.


- A standard on the household power system should be developed and deployed so that the future system is robust and in line with the requirement of electric appliance.
- The pilot project undertook an energy audit of the households and supply system, also made necessary recommendation for required replacement. Those learning shall be populated in form of standard electrical system minimum pre-requirement for households, local CREE, or local municipality for future connections so that their systems can be utilised for electric cooking





8. ANNEX

8.1 ANNEX I: Focus Group Discussion with ECA Users









Attendance for FGD Participants (e-Cookstove Users)

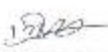



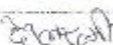

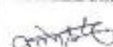

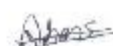

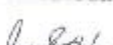

Research Implementing Organization: Practical Action Consulting Pvt. Ltd

Project Name: Eco-Follow Up Study at Mangaltar, Kavre

Award Code: QR00724

Project Code: NPL90140

On January 21, 2023, a Focus Group Discussion was organized with the users of e-cookstoves to validate the data collected via Eco-Follow Up questionnaire survey. Besides, by signing this attendance sheet, the participants also gave their consent to record the discussion, click photographs and capture video of the FGD

S.N	Name	Address	Mobile No	Signature
1	Gita Badal Poudel	Mangaltar Rosi-9	9813702464	
2	Indu Maya Tamang	Mangaltar Rosi-9	9823204782	
3	Sova Subedi	Mangaltar Rosi-9	9842280930	
4	Sita Adikari	Rosi-9 Mangaltar	9860023970	
5	Dev Lokmi Shrestha	Mangaltar Rosi-9	9841209497	
6	Kamala Adhikari	Mangaltar Rosi-9	9869625956	
7	Goma Shrestha	Mangaltar Rosi-9	9823581615	
8	Uej Kumar Shrestha	Mangaltar Rosi-9	9813128079	
9	Dhananaya Shrestha	Mangaltar Rosi-9		
10	Indra Kumar Shrestha	Mangaltar Rosi-9	9842693267	
11	Sarita Shrestha	Mangaltar Rosi-9	9823271873	
12	Sabita Lama	mangaltar-9 Pinmail	9803870922	



Attendance for FGD Participants (e-Cookstove Users)

Research Implementing Organization Practical Action Consulting Pvt. Ltd

Project

Name Eco-Follow Up Study at Mangallar, Kavre

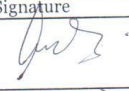
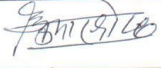
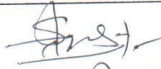
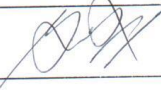
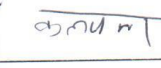

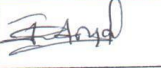
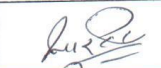
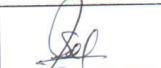
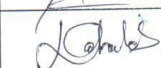

Award Code QR00724

Project Code NPL90140

On January 21, 2023, a Focus Group Discussion was organized with the users of e-cookstoves to validate the data collected via Eco-Follow Up questionnaire survey. Besides, by signing this attendance sheet, the participants also gave their consent to record the discussion, click photographs and capture video of the FGD

S.N	Name	Address	Mobile No	Signature
1	Bipin Baret		985121313	
2	Manoj Phapa	Km 1	9849570999	
3	Niraj Shrestha	Babermahal-11, Ktm	9851065571	
4	Dewasish Dahal	Pulchowk-8	9825314554	
5				
6				
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10				
11				
12				

8.2 ANNEX II: Focus Group Discussion with Existing Supply Chain Actors

Attendance for FGD Participants (Local Stakeholders and Market Actors)				
Project Name Eco-Follow Up Study at Mangaltar, Kavre				
Award Code QR00724				
Project Code NPL90140				
On February 10, 2023, a Focus Group Discussion was organized with the stakeholders and market actors from Mangaltar, Kavre.				
S.N	Name	Address	Mobile No	Signature
1	Jaganath Poudel	Rosi-9 Mangaltar	9843780683	
2	Indra Kumar Shrestha	Rosi-9 Mangaltar	9879393236	
3	Sachin Lama	Roshi-5 Mangaltar	984356632	
4	Saraj Kumar Shrestha	Roshi-9 Mangaltar	9780828802	
5	Kalpna Sunar	Roshi-9 Mangaltar	9808019011	
6	Dev Kumar Rana	Roshi-9))	9846081341	
7	Indu Aryal		9847156017	
8	Sanita Shrestha	"	9829274873	
9	Sabit Lama	"	9803870922	
10	Dewasis Dahal	"	9825314554	
11	Niraj Shrestha	"	9841502803	
12				