

## Electric Cooking Outreach (ECO) Follow-up Study



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### Members of Research Team:

Govinda Khanal  
Rabin Shrestha  
Sandeep Kantha

### Contact Details:

**Name:** Govinda Khanal

**Telephone number:** +97 9803704128

**Email:** [Khanalgovin@gmail.com](mailto:Khanalgovin@gmail.com)

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## Executive Summary

In 2021, Winrock International, in collaboration with the local partner Renewable Energy, Water Supply and Sanitation Promotion Centre (REWSSPC), conducted a 6-month pilot project “Efficient Electric Cooking Market Uptake in Nepal” for Modern Energy Cooking Services Electric Cooking Outreach (MECS-ECO) program managed by Loughborough University and funded by UKAid (Foreign, Commonwealth and Development Office (FCDO)). One year later, this follow-up study has been conducted by Environment Protection Centre at the same location (Katahariya Municipality, Wards 2 and 3) to assess the longer-term impacts of the ECO pilot. This follow up research has studied the current usage of electric pressure cookers (EPCs) in the intervention households as well as the interest generated in the non-intervened households in the community through EPC introduction and word-of-mouth publicity from the ECO participants.

The main objectives of the follow-up study are to identify the longer-term impact of the ECO pilot study on the cooking practice of the community for both the ECO participant and non-participant households and to identify/suggest measures on how the ECO pilot studies could operate as launchpads to outscale electric cooking in the community and its surroundings. The approach of the study was as follows:

- Indicative Cooking diary study and survey of ECO-participant households: Total 30 households, 10 General and 5 disadvantaged group (DAG) households from each ward
- Intensive cooking diary study: Total 10 households, 3 General and 2 DAG households from each ward
- Non-Participants Survey: Total 50 households, 25 households from each ward.
- Analysis of follow-up intensive cooking diary, indicative cooking diary, non-participants survey as well as cooking diary data and exit survey data of the original ECO pilot study.

### ECO-participants

Out of 30 households surveyed, 23 households (15 General households and 8 DAG households) have their EPCs in working condition and they are still using the EPCs. Findings from the intensive cooking diary indicate a slight decrease in the use of EPC for both the DAG and General households from 15% to 12% and 17% to 13% respectively in terms of the percentage of heating events per fuel. A huge increase in LPG use was observed from 23% to 66% in DAG households and 38% to 73% in General households with a massive decline in firewood use from 62% to 23% in DAG households and 45% to 15% in General households. The higher use of LPG and partially sustained EPC may have been influenced by people’s choice of cleaner fuel and/or seasonal effects. During monsoon, there will be a lack of dry firewood which also makes people use more LPG or EPC.

Of all the dishes cooked in the 10 households during the two weeks of intensive cooking diary data collection, around 70% were cooked in LPG, 18% in Firewood, and 12% in EPC. Rice was the major food cooked in the EPC as almost 60% of the total rice cooked across all stoves was in EPC and 98% of all dishes cooked in the EPC were rice. People prefer simultaneous cooking. Therefore, households have been using EPC for cooking rice whereas other stoves for cooking other items. During the indicative cooking diary, all of the 30 participants expressed a desire to buy another EPC so that they could cook dishes simultaneously that would save their cooking time. No change was reported in terms of change in cooking responsibility after the end of ECO pilot study.

During the interaction meeting with ECO participants, it was found that the perception of ECO participants regarding the benefits of using EPC has not changed. However, concerns were raised about the technical issues they are facing on their EPCs. Almost all of the EPCs have lost their inner coating. Few EPCs have a hole in their inner pot. They are very much concerned that there is no local

repair and maintenance service available in the area and they do not know where to purchase any spare parts they need.

### **ECO Non-participants**

Out of 50 non-participants, 9 households only owned biomass stoves, 20 households owned LPG only, and the remaining 21 households owned both biomass stoves and LPG stoves. Most of the households both purchase and collect firewood. The average spending on purchasing firewood is around NPR 7000 annually. Similarly, the total average LPG consumption per household that uses LPG for cooking is 7 cylinders per year which means they spend around NPR 13,000 yearly. There is an opportunity for the non-participants to invest in electric cooking by saving the cost of buying firewood and LPG.

The finding from the non-participants' survey was consistent with the eco-participants' indicative diary and cooking diary survey where all showed LPG as the dominant fuel in the majority of the survey households. This suggests that community households are choosing cleaner fuels and prefer easiness and comfort over cost. Additionally, a seasonal effect should also be considered here. During interaction with the surveyed households, it was also reported that they use LPG more during summer/monsoon whereas Firewood is used more during the winter season.

The non-participant survey showed that the benefits of EPC have reached beyond the ECO-participants to the community level. 41 out of 50 non-participants who had discussed cooking in EPC with their family, friends, ECO beneficiaries, NGO representatives, and others reported being interested in buying the EPC after talking to them. This implies that peer-to-peer awareness raising is impactful in generating interest. Most of the non-participants perceive electric cooking to be cheaper, safer, and easier to operate and the foods cooked with electricity taste better. The non-participants also expressed a desire to purchase EPC but none of them have bought it so far. They think the upfront cost is out of their capacity and waiting for free distribution or heavy discount/subsidy.

### **Launchpad for Outscaling**

ECO pilot studies conducted in different parts of the country by various organizations have raised awareness and knowledge on the benefits of electric cooking, particularly of EPC. The lessons learned from the ECO pilot study and the subsequent follow-up can be used to out scale eCooking in the community and its surroundings. The study found that positive word-of-mouth from family and friends generates interest among people to purchase electric cooking appliances. Therefore, it is important to encourage early adopters of electric cooking to share their experiences with friends and family, as word-of-mouth recommendations can be influential.

The follow-up study also found that the lack of locally provided after-sales service compels EPC users to abandon cooking in EPC whenever there is a technical issue with the appliance. This also lowers their confidence in cooking on electricity. Therefore, it is pivotal to strengthen the electric cooking supply chain to the nearest market with the availability of spare parts and repair and maintenance services.

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## List of Acronyms

AEPC	Alternative Energy Promotion Centre
DAG	Disadvantaged Group
ECO	Electric Cooking Outreach
EPC	Electric Pressure Cooker
FCDO	Foreign, Commonwealth and Development Office
GCF	Green Climate Fund
LPG	Liquified Petroleum Gas
MECS	Modern Energy Cooking Services
REWSSPC	Renewable Energy, Water Supply and Sanitation Promotion Centre
ToR	Terms of Reference
UK	United Kingdom
VAT	Value Added Tax



# 1. Introduction

Winrock International, in collaboration with the local partner Renewable Energy, Water Supply and Sanitation Promotion Centre (REWSSPC), conducted a pilot project “Efficient Electric Cooking Market Uptake in Nepal” for Modern Energy Cooking Services Electric Cooking Outreach (MECS-ECO) program managed by Loughborough University and funded by Foreign, Commonwealth and Development Office (FCDO). The pilot was conducted between July 2020 to December 2021 to understand consumers’ preference for the use of electric pressure cookers (EPCs), willingness to pay, preferred business models, economic benefits of EPCs, and impacts of EPCs on existing electricity infrastructure. Together with other Nepal ECO partners, the project also expanded the knowledge of wider stakeholders (policymakers from Local, Provincial, and Federal Governments, private sectors, financial institutions, academicians, journalists, etc.) on the benefits of EPC and conducted policy advocacy for scaling up EPCs and viable business/financial models.

The pilot study was conducted in 50 households (30 general Households and 20 Disadvantaged Group (DAG) households) in wards 2 and 3 of Katahariya municipality of Rautahat district by using questionnaire surveys and cooking diary (intensive and light) approaches<sup>1</sup>. The study showed that the introduction of EPCs reduced the use of fuelwood by 5% in DAG households and 9% in General households whereas LPG use fell by 10% in DAG households and 8% in General households, suggesting EPCs are more likely to replace LPG more than fuelwood which is mostly available for free of cost. The study concluded that the EPC enables some cooking to be transferred to electricity but does not seem to completely replace the LPG or biomass stoves fully and highlighted the need for local service centres to handle repair and maintenance to increase household confidence in EPCs and enable a greater shift to electric Cooking.

This follow-up study has been conducted by Environment Protection Centre (formerly REWSSPC) at the same location to assess the longer-term impacts of the ECO pilot. The study has monitored the current usage of EPCs in the intervention households as well as the interest generated in the non-intervened households in the community through EPC introduction and word-of-mouth publicity from the ECO participants.

## Objectives of the follow-up study

The main objective of the follow-up study is to understand the impact of the ECO pilot studies on cooking practices in the community over a longer timeframe. The study focuses on whether eCooking practices have changed among the ECO participants, but also examines the impact of the ECO pilot on non-participant views of electric cooking and whether the pilot study has led to greater awareness of electric cooking in order to inform the potential opportunities for further local uptake. The specific objectives include:

- To identify the longer-term impact of the ECO pilot study on the cooking practice of the community for both the ECO participant and non-participant households.
- To identify and suggest measures on how the ECO pilot studies could operate as launchpads to scale up locally or ‘outscale’ electric cooking in the community and its surroundings.

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<sup>1</sup> See [MECS \(2022\)](#) blog for details of the Cooking Diaries used in the ECO pilot.

## 2. Methodology

The methodology for this follow-up study is in line with the Terms of Reference (ToR) developed by MECS. The cooking diary and survey materials have been adapted from the templates provided by MECS, where necessary. We used KoBoToolbox for collecting data from surveys and cooking diaries. We conducted the field-level data collection by deploying the enumerator involved in the earlier ECO pilot project who was trained on the data collection methods and tools.

**Study Location:** The location of the follow-up study (for both ECO participants and non-participants) was the same as that in the pilot study i.e., wards 2 and 3 of Katahariya Municipality, Rautahat.

**Indicative Cooking diary study and survey of ECO-participant households:** The previous ECO pilot project had 50 households, 30 from General Households and 20 from DAG Households. This follow-up study conducted an indicative cooking diary study and survey of 30 Households, 20 belonging to General and 10 from the DAG pool. The number of households were selected equally from both wards 2 and 3. The study identified what changes have occurred in their cooking practices since the end of the pilot study. For example, how frequently the ECO participants are using the EPCs, what dishes are being cooked in them, whether anyone bought or is willing to buy new cooking devices, challenges, and opportunities of purchasing new cooking devices, the effect of reduction in the ECO pilot support mechanism, etc. The study used the template provided by MECS and adapted to the local context as necessary.

**Intensive Cooking diary study:** As indicated in the ToR, we selected a total of 10 households from the 30 households who were part of the indicative cooking diary study and survey. Five households from each ward (3 General households and 2 DAG households) were selected and cooking data were collected by using a cooking diary-intensive approach (as per MECS guidelines) for 2 weeks to provide quantitative evidence to support the findings from the indicative cooking diaries study and survey.

**Survey of 50 non-participant households:** A total of 50 households (25 from each of the two wards) were surveyed to identify if there has been any change in their cooking practices after the introduction of EPCs in the community. The survey gathered information on how eco-pilot studies can be designed so that they can generate additional interest and uptake in the community and surrounding areas. The study used the survey template provided by MECS and adapted it to the local context as necessary. Typical questions included change in cooking practices, perception of electric cooking, any households started electric cooking on their own, opportunities and challenges of starting electric cooking, required technical and financial support, etc.

**Interaction meeting with ECO participants and non-participant households:** The interaction meeting followed by a few household visits was conducted after completing the data analysis. The meetings helped us verify certain points emerging from the data and gather qualitative information regarding cooking practices in the community.

**Data Analysis:** The data and information collected during the data collection phase were analyzed by using KoBoToolbox and MS Excel.

**Report Preparation:** A final report was prepared and submitted based on the findings of the study. The report consisted of chapters such as Introduction, objectives, methodology, findings, conclusion, recommendation, and dissemination plans. Similarly, a PowerPoint presentation detailing the main research findings, conclusions, and recommendations was submitted along with the final report.

**Dissemination:** The final report of the study will be shared through social media, and study information will be made available on the official web portal of MECS and Environment Protection Centre.

### 3. Results

This section presents findings based on the intensive cooking diary analysis of 10 ECO-participant households, an indicative cooking diary survey of 30 ECO-participant households, and a survey of 50 non-participant households.

#### I. ECO Participants

**Are ECO participants still using the eCooking appliances provided? Are they using them more/less and why? How has the cooking fuel stack changed?**

All the 30 eco-participants still have the EPCs with them. Out of that, 23 households (15 General households and 8 DAG households) reported that their EPCs are in working condition and they are still using the EPCs. Seven EPCs are not in working condition due to damage in the power cord (2), a hole in the inner pot (2), a leak from the gasket of lead (1), electric shock on the outer surface of the EPC (1), and inner pot doesn't heat (1).

While comparing the fuel use pattern between the Endline phase of the original ECO study with the follow-up study, Figure 1 shows that the main fuels are still the same Firewood, LPG, and Electricity. However, there has been slight decrease in the use of EPC for both the DAG and General households from 15% to 12% and 17% to 13% respectively in terms of the percentage of fuel use at dish level illustrating the partially sustained use of EPC over the full ~18month study period (transition phase to follow up study). During the follow-up study, a massive increase in LPG use was found from 23% (endline) to 66% in DAG households and 38% to 73% in General households with a huge decline in firewood use from 62% to 23% in DAG households and 45% to 15% in General households.

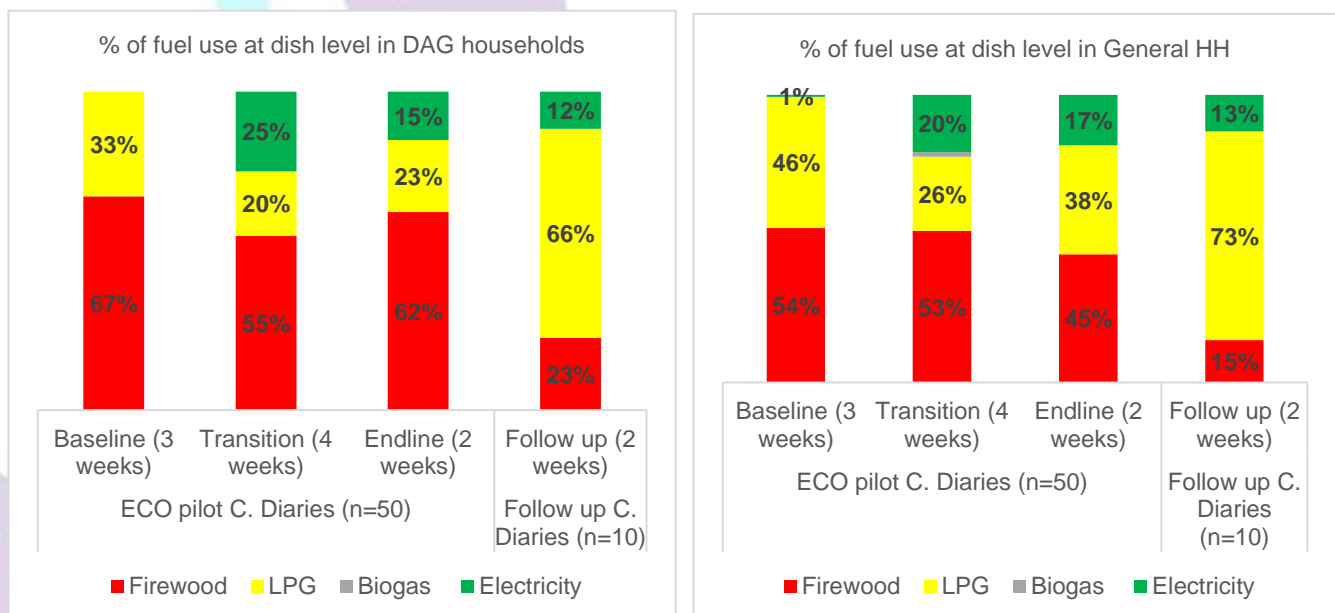


Figure 1: Percentage of Fuel use at dish level in DAG households (left) and General households (right)

One of the main reasons for the higher use of LPG during the follow-up study can be attributed to the seasonal change. The data were collected during the start of the monsoon. During this time, the availability of dry firewood is limited. Similarly, this is also the time when the local people are heavily

engaged in farm activities (for paddy plantation). Therefore, they tend to adopt quicker methods of cooking. The people want to cook multiple dishes over a short period of time and the two burners of the LPG stoves allow them to cook simultaneously. The people used the EPCs almost entirely for cooking rice and other things were mostly cooked in the LPG. When the total dish level data combined of DAG and General households was compared as shown in Figure 2, it was found that around 12% of all the dishes cooked were cooked in the EPC, whereas almost 18% on firewood and about 70% on LPG. When the foods cooked in the EPC were segregated with dish type, it was found that 98% of the total dishes cooked in EPCs was rice whereas 2% was vegetables.

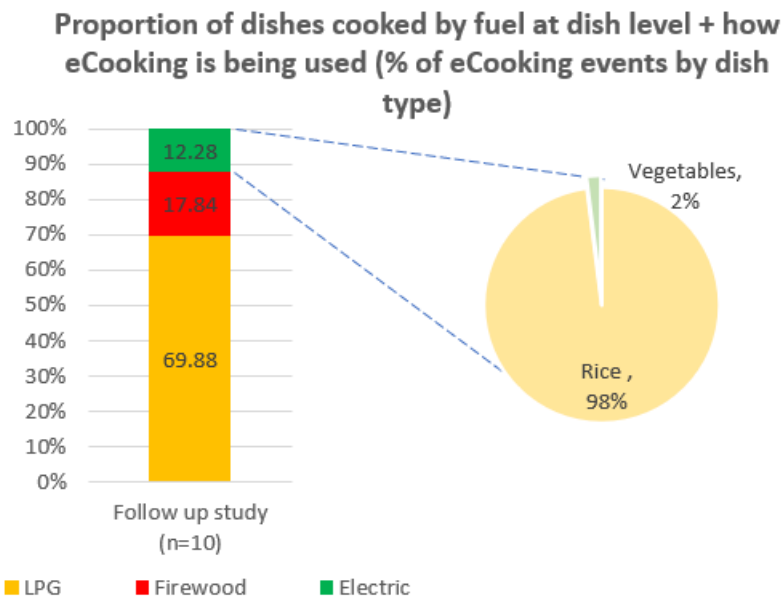


Figure 2: Percentage of dishes cooked by fuel at dish level and percentage of dish type cooked in EPC

The average electricity consumption to cook rice in the EPC was found to be 0.32 kWh with an average family size of 7.9 during the follow-up study. The average electricity consumption to cook rice in EPC was a little higher 0.36 kWh during the endline phase which can be explained by a little higher average family size of 8.6. The average household cooked rice in EPC once a day, usually in the morning. As the EPC is used almost entirely for cooking rice, a more energy consuming (staple) dish, it may be that the scale of transition to eCooking in energy terms is actually larger than that indicated by the proportion of dishes parameter.

An indicative cooking diary survey was conducted in 30 eco-participant households. They were asked about the different dishes they typically cook in their house and their choice of fuel for cooking the dish. The number of per household cooking events was found to be higher in General households (181) compared to that in DAG households (120). Table 1 shows the segregation of number of dishes cooked in different fuels on a typical day.

Table 1: Total number of dishes cooked per fuel and percentage of overall total dishes segregated by DAG and General households (n=30).

Fuel	Total no of dishes cooked on the fuel		% of overall total dishes		
	General household	DAG household	General household	DAG household	Total
Firewood	13	20	7%	17%	11%
Electricity	32	14	18%	12%	15%
LPG	136	86	75%	72%	74%
Total	181	120	100%	100%	100%

From Figure 3, we can see that 74%, 15%, and 11% of the total cooking events on a typical day were cooked on LPG, Electricity (EPC), and Firewood respectively in the 30 households. The data disaggregated to General and DAG households show that the DAG households (17%) used more than twice the firewood compared to General households (7%). LPG and EPC usage were also higher in General households than those in the DAG households.

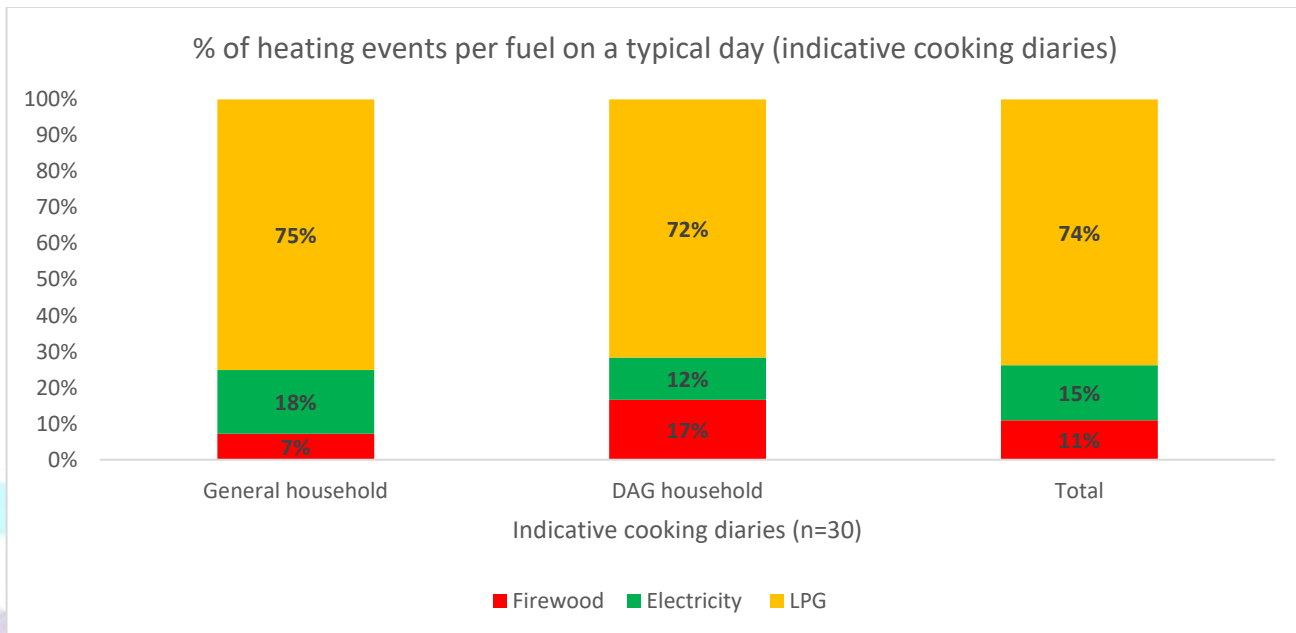


Figure 3: Percentage of heating events per fuel on a typical day (indicative cooking diaries)

Figure 4 shows the percentage of dishes cooked per fuel on a typical day collected by the two methods, the indicative cooking diary of 30 households and the intensive cooking diary of 10 households divided further as General and DAG households. The intensive cooking diary is more precise than the indicative cooking diary as it records the actual cooking data from a household on a daily basis whereas an indicative cooking diary only records the general trend of cooking on the household level.

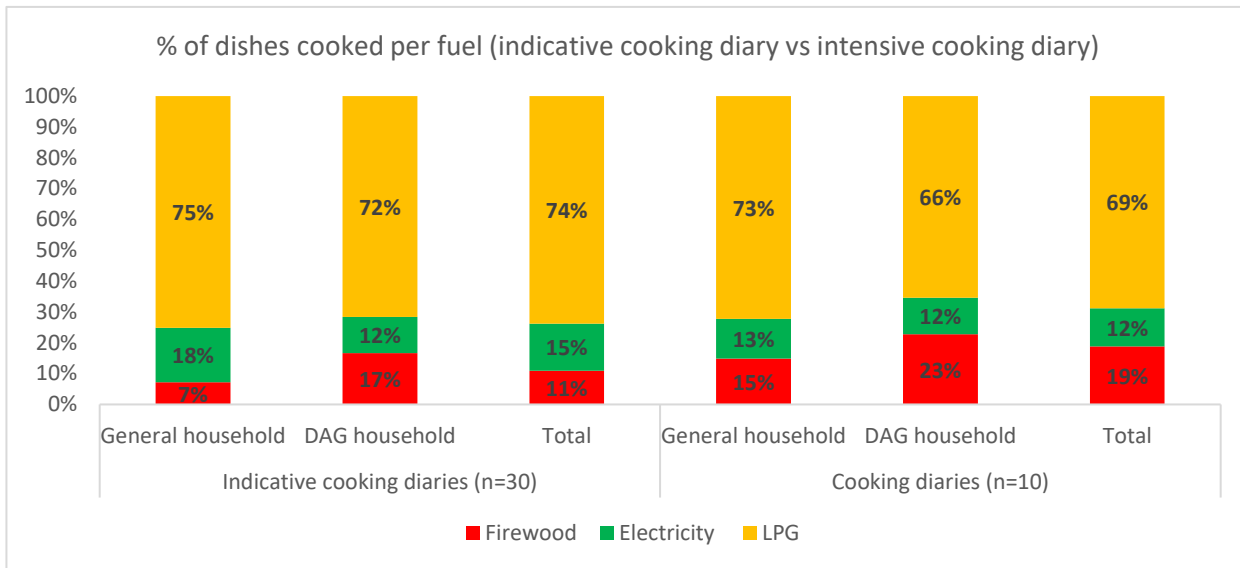


Figure 4: Percentage of dishes cooked per fuel (indicative cooking diary VS intensive cooking diary)

Although the overall trends in the indicative cooking diary and the intensive cooking diary data align and were found to be in the same order (LPG>Electricity>Firewood), Figure 4 shows some differences in the actual percentage of fuel use. The intensive cooking diary method showed lesser LPG use in both the General and DAG households compared to that shown by the Indicative cooking diary method. Similarly, the intensive cooking diary method reported lower use of EPC for General households and equal EPC use for DAG households whereas higher Firewood use for both General and DAG households. The findings from the larger indicative cooking diaries data suggest broader sustained uptake of the EPC in the community but may indicate EPC use is slightly lower than that indicated by (the smaller but more precise) intensive cooking diaries data. Both the indicative cooking diary and intensive cooking diary methods show that the majority of the dishes are cooked in the LPG.

**Have there been any changes in how the appliances are being used (e.g. type of dishes/meals cooked)?**

Figure 5 shows the percentage of main dishes cooked in the EPC during the ECO study (Transition and Endline phases) and the follow-up study. There has been a remarkable change in the dishes cooked in the EPCs. During the ECO study, more dishes were cooked in the EPCs whereas during the follow-up study, mostly rice was cooked in the EPC followed by a few cases of vegetable curry. The 10 households in the intensive cooking diary did not cook lentil soup, meat, or green leafy vegetables in the EPC.

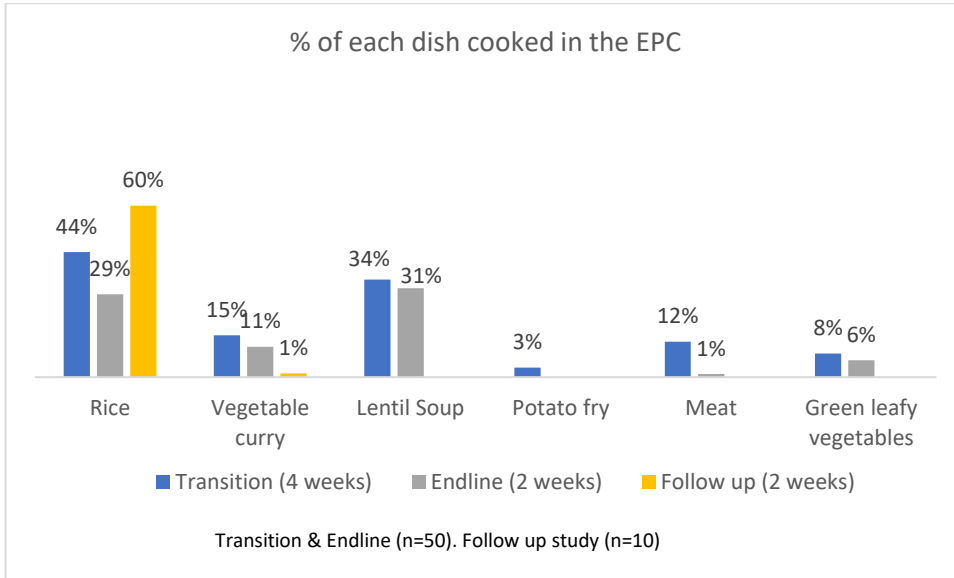


Figure 5: Percentage of each dish cooked in the EPC during Transition, Endline and Follow up phases

When we look at the percentage of each dish cooked in the EPCs, it was found that 60% of all rice cooked was in the EPCs.

Figure 6 shows the percentage of EPC cooking events by dish as reported during indicative cooking diary survey and intensive cooking diary data collection. The intensive cooking diary showed that EPC accounted for cooking 98% of rice followed by 2% of vegetable curry. However, as per the indicative cooking diary, 41% accounted for lentil soup which was not observed during the intensive cooking diary. Due to the different sample sizes, it could be that the households that use EPCs for cooking lentil soup in the EPC were not included in the intensive cooking diary method. Nevertheless, it can be said that the use of EPC is limited to cooking a few dishes compared to what the device can cater to.

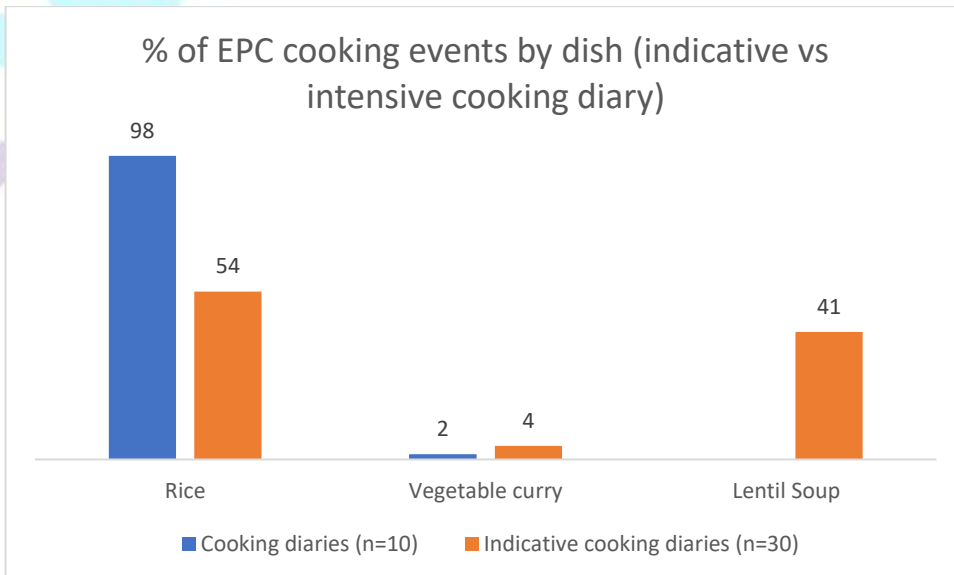


Figure 6: Percentage of each dish cooked in EPC (indicative cooking diary VS intensive cooking diary)



**Have cooking practices for ECO participants changed since the end of the pilot study? How? Have perceptions of eCooking changed? how? Why?**

The biggest change in cooking practices for ECO participants since the end of the pilot study is that their primary choice of fuel has shifted from firewood to LPG at dish level. In terms of total heating events at dish level, EPC has become the first choice for cooking rice despite remaining third in overall use. In terms of the change in responsibility for cooking, there has not been any change since the end of the ECO project.

During the registration survey at the start of the ECO project, only 8% of other family members (all female) were reported of doing some cooking. The numbers rose to 14% with an additional increase in 24% male involved in some cooking after the introduction of EPC in their households as mentioned during the exit survey. During the follow-up study, 100% of the respondents reported no change in their cooking responsibility compared to the exit survey. Figure 7 shows the response in terms of change in the responsibility of cooking.

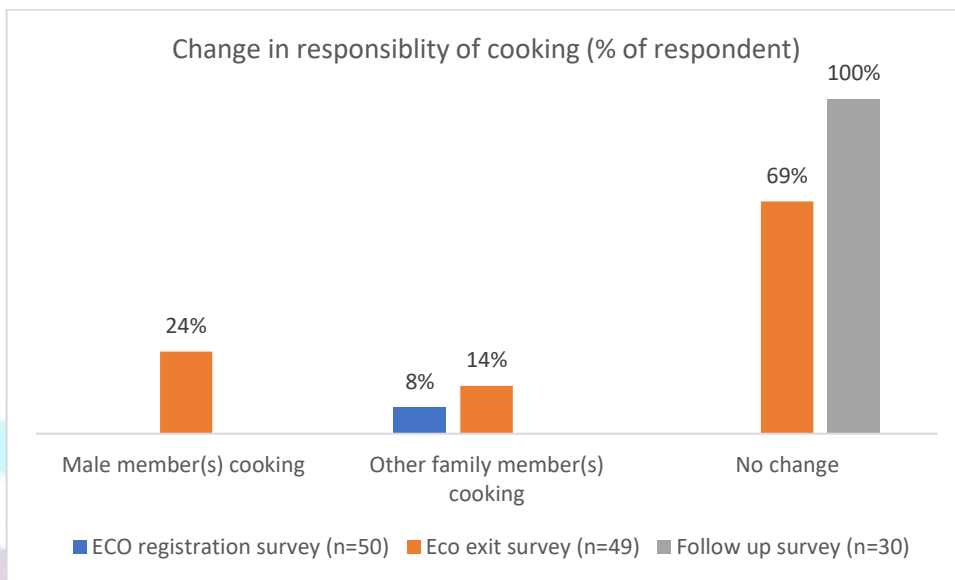


Figure 7: Change in responsibility of cooking (% of respondents) during registration, exit survey and follow-up

During the interaction meeting with ECO participants, it was found that the perception of ECO participants regarding the benefits of using EPC has not changed. However, concerns were raised about the technical issues they are facing on their EPCs. Almost all of the inner pots have lost their non-stick coating, while a few EPCs have hole in their inner pot. They are very much concerned that there is no local repair and maintenance service available in the area and they do not know where to purchase any spare parts they need. One example to show the perception of ECO participants hasn't changed is that all of them want to buy an additional EPC. However, some of the participants also mentioned that they do not like to cook lentil soup in the EPC as it takes longer time to cook and gets stuck at the bottom since the EPCs no longer have the non-sticky coat in the inner pot.

### **Have any ECO participants bought an additional cooking appliance (electric or non-electric) or expressed an interest to do so? What are the opportunities and challenges behind purchasing an additional eCooking appliance device?**

During the indicative cooking diary, many ECO participants reported buying a new LPG stove, but during the interaction meeting it was revealed that most of them had bought additional LPG cylinders so that they could stack LPG cylinders. Multiple LPG cylinders are useful for the uninterrupted use because to replace LPG cylinders they have to go to the nearby city and sometimes they have to wait in a queue during shortages. They have also expressed interest in buying a new EPC. The reason for desiring additional EPC was to cook two dishes simultaneously. However, none of the ECO participants reported purchasing new EPC on their own. The main barrier to purchasing a new EPC was said to be the cost.

During the interaction meeting, it was also reported that only a few non-participants had approached them to ask about EPC. To those who have approached, the ECO participants have recommended the EPC positively.

### **What have been the effects of the reduction in the support mechanisms provided by ECO awardees during the initial ECO pilot studies?**

Despite the reduction in support mechanisms, most of the households are continuously using EPCs on their own. The overall share of electric cooking reflected by the number of heating events has slightly decreased compared to the endline phase of the ECO project. Almost all the EPCs have lost their inner coating. Seven EPCs are not in working condition and the households have not repaired them due to the unavailability of the local repair centre. During the ECO study, they sent the devices to Winrock (at Kathmandu) for the repairment. During the follow-up, the ECO participants were almost entirely cooking rice in comparison to the greater range of dishes cooked in EPC during the ECO project. It could be because during the ECO project, enumerators used to visit households daily, and they may have felt compelled to use EPCs and try cooking different dishes. In addition, it seems the issues with the non-stick coating may have discouraged people from cooking lentil soup which was frequently cooked in the EPC during the ECO pilot. After the ECO project ended, it was revealed that the local municipality had promised to pay all the electricity bills of every household in the municipality, however, that was never materialized, and the people had to pay their electricity bills themselves.

### **Concluding summary:**

Overall, the majority of the ECO participants have been continuously using the EPC provided during the ECO pilot project. The share of electric cooking shown by the percentage of heating events has shown that the EPC has partially sustained since the end of the original ECO project despite some technical issues in the appliance. People seem to be leaning towards the cleaner fuel option as shown by the increased use of LPG. Rice has become the most popular dish to cook in the EPC. People have desired to buy additional EPC for simultaneous cooking. However, the lack of local repair and maintenance service has been flagged as a concern.

## II. ECO Non-Participants

### Sub question 1. Have cooking practices for non-participants changed since the end of the pilot study? How? Have perceptions of eCooking changed? how? Why?

Altogether 50 households, 25 each from Ward 2 and Ward 3 that were not part of the original ECO study, were surveyed on their cooking practices and whether they had changed since the ECO pilot. There were 21 Male and 29 Female respondents during the survey. The age of the respondents ranged between 22 and 50. A total of 46 households have indoor kitchens whereas 3 have outdoor kitchens. 1 household has kitchen both indoor and outdoor and uses a biomass stove in the outdoor kitchen and an LPG stove in the outdoor kitchen. The households reported cooking at least 3 times a day and the average family size that they usually cook for was found to be 8 (ranging between 3 and 15) including on average 3 children.

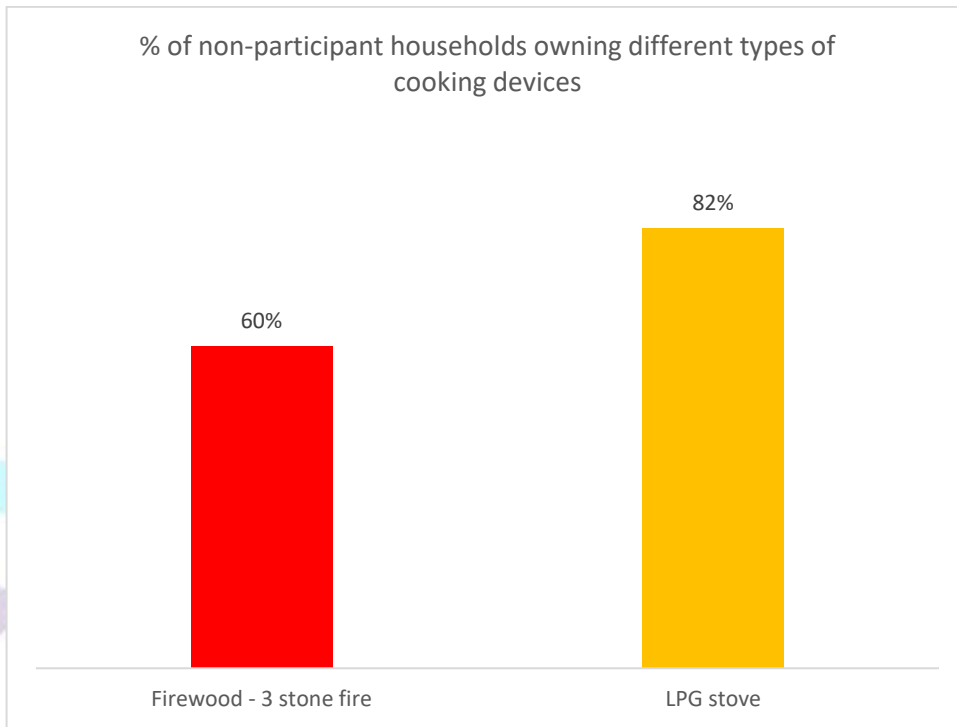


Figure 8: Percentage of non-participant households owning different types of cooking devices

As per the survey, 9 households reported owning biomass stoves only, whereas 20 households reported owning only LPG and the remaining 21 households reported owning both biomass stoves and LPG stoves. Figure 8 shows that 82% of the respondents reported owning an LPG stove whereas 60% reported owning a biomass stove. The households did not report owning any electrical cooking appliances. Figure 9 shows the frequency of using these biomass stoves and LPG stoves. LPG stoves tended to be used more frequently. 12% of the households reported cooking in LPG stoves once a day, 39% twice a day, 46% thrice a day, and 2% more than three times a day. In comparison, biomass stoves were used by 60% once a day, 13% twice, 23% thrice, and 3% more than three times daily.

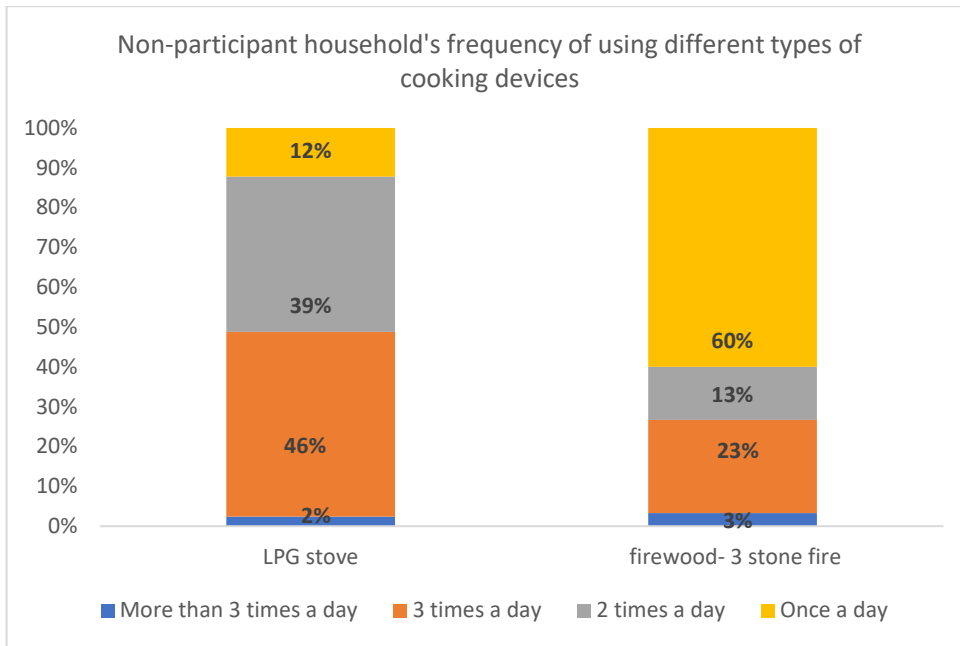


Figure 9: Non-participant household's frequency of using different types of cooking devices

The households reported both purchasing and collecting firewood. The average number of purchases is 7 times a year. They purchase roughly 100 Kg of firewood each time and spend approximately NPR 10 per kilo. Firewood is collected from their own garden or from the nearby forest. Likewise, the total average LPG consumption per household that uses LPG for cooking is 7 cylinders per year. When compared with the households that use both LPG and firewood, the average LPG consumption was found to be 6 cylinders per year and the average number of firewood purchases was also found to be 6 per year. A standard LPG cylinder weighs 14.2 Kg LPG and costs around NPR 1900 (1800 + transportation charge).

Table 2: Average annual fuel consumption and expenditure

Cooking fuels used	Average consumption year	fuel per	Unit cost	Annual cost
Firewood	7 * 100kg		10 NPR / kg	7,000 NPR
LPG	7*14.2kg		1900 NPR/14.2kg	13,300 NPR
Firewood and LPG	6*100kg + 6*14.2kg		Same as above	17,400 NPR

The findings from the non-participants showed LPG as the dominant fuel in the majority of the survey households. Likewise in the eco-participants indicative diary and cooking diary, this survey also showed that the households are cooking in LPG more than that in the firewood despite typical annual LPG cooking fuels costs being almost double (Table 2) This suggests that community households are choosing cleaner fuels and prefer easiness and comfort over cost. Additionally, a seasonal effect should also be considered here. During interaction with the surveyed households, it was also reported that they use LPG more during summer/monsoon whereas Firewood is used more during the winter season. During the wet season, it is difficult to find dry firewood. Additionally, the beginning of the monsoon season also involves a lot of work in farmland, especially for planting rice. Due to these reasons, the people prioritize speed and convenience over cost.

### Perception of electric cooking

Figure 10 highlights the perception of electric cooking among the surveyed households. The perceptions were captured in terms of taste, safety, cost, and difficulty of cooking in electricity. Although the households have no firsthand experience in using electric cooking appliances by themselves, their responses are based on the knowledge they acquired from external sources such as promotional events in the area during the ECO pilot, views of EPC users, own knowledge, etc.

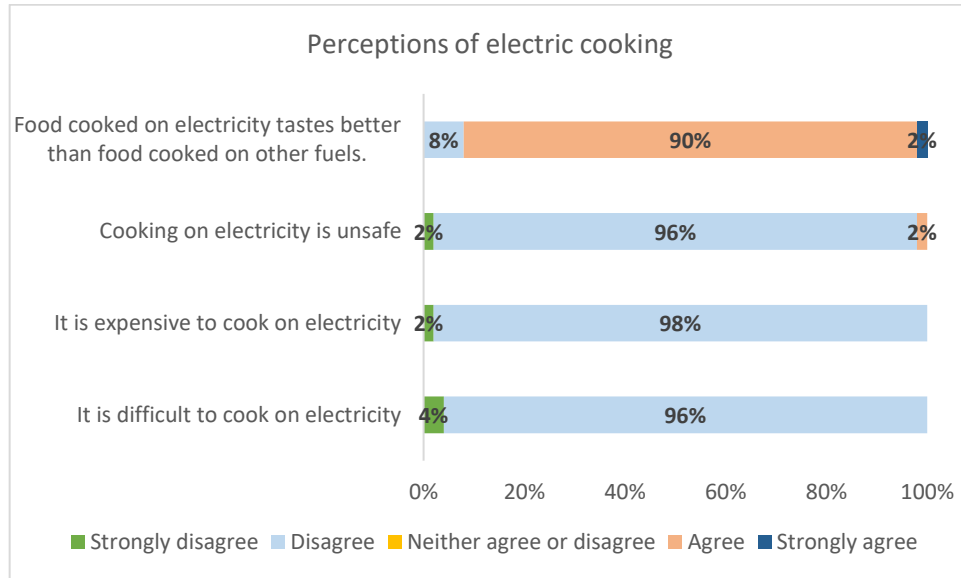


Figure 10: Non-participant perceptions of electric cooking

Respondents were overwhelmingly positive about eCooking in all four key metrics. A majority of 90% of households agreed that the food cooked on electricity tastes better than the foods cooked on other fuels. An additional 2% strongly agreed to the statement. Only 8% of the respondents disagreed that the food cooked on electricity tastes better than the foods cooked on other fuels. Furthermore, 98% perceived that cooking on electricity is safe, and 100% of respondents disagreed with the statements that it is expensive and difficult to cook with electricity. Overall, the vast majority of the respondents perceive electric cooking as safer, less expensive, easy to cook and the foods cooked on it taste better.

Out of the 50 households, 41 reported that they have discussed electric cooking with different people and organizations. The most discussed was with their family members (23) followed by friends (10), ECO project beneficiaries (5), NGO representatives (2), and others (1). Figure 11 shows the breakdown of the number of non-participants discussing eCooking with different people/organizations.

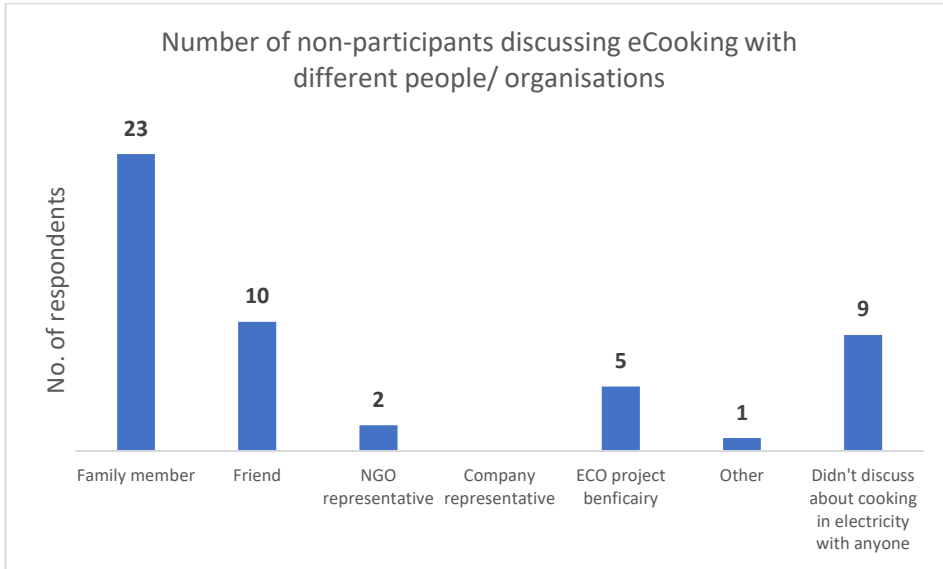


Figure 11: Number of non-participants discussing eCooking with different people/ organisations

Figure 12 shows that 100% of households who discussed with different people and organizations agreed that speaking with the person made them more interested in purchasing an electric cooking appliance. Among the 10 participants who talked with their friends, 2 of them strongly agreed that they were more interested in buying an electric cooking appliance after talking with them. This shows that there is an overall positive perception of electric cooking in the community. People tend to trust the views of family and friends over others which is also shown in Figure 15.

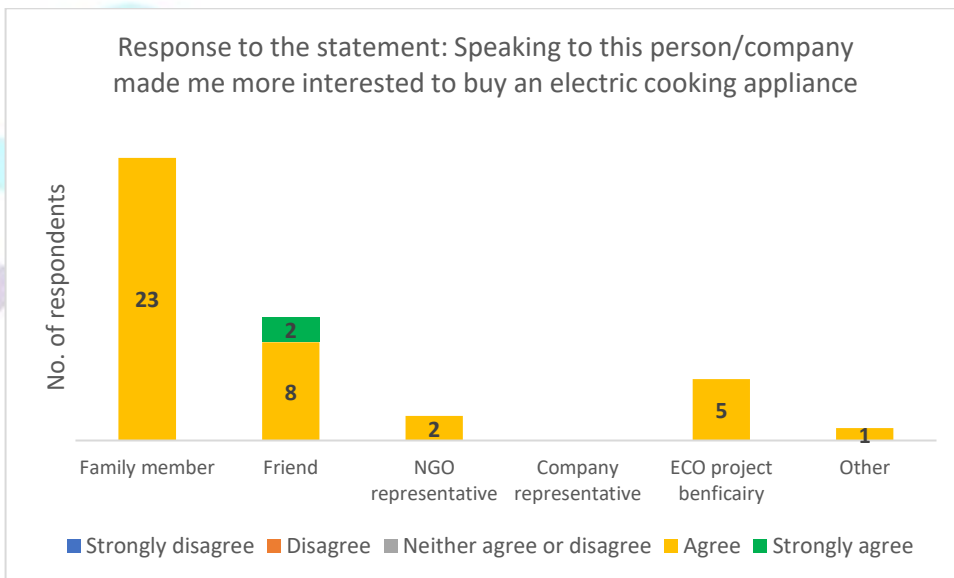


Figure 12: Response to the statement: Speaking to this person/company made me more interested to buy an electric cooking appliance

### Impact of ECO project

A total of 30 respondents mentioned that they were aware of the original ECO project, some of them had participated in the awareness-raising and demonstration activities while some were present in the local-level dissemination event conducted during the eco study. Besides, a few people also mentioned that they heard it from eco beneficiaries.

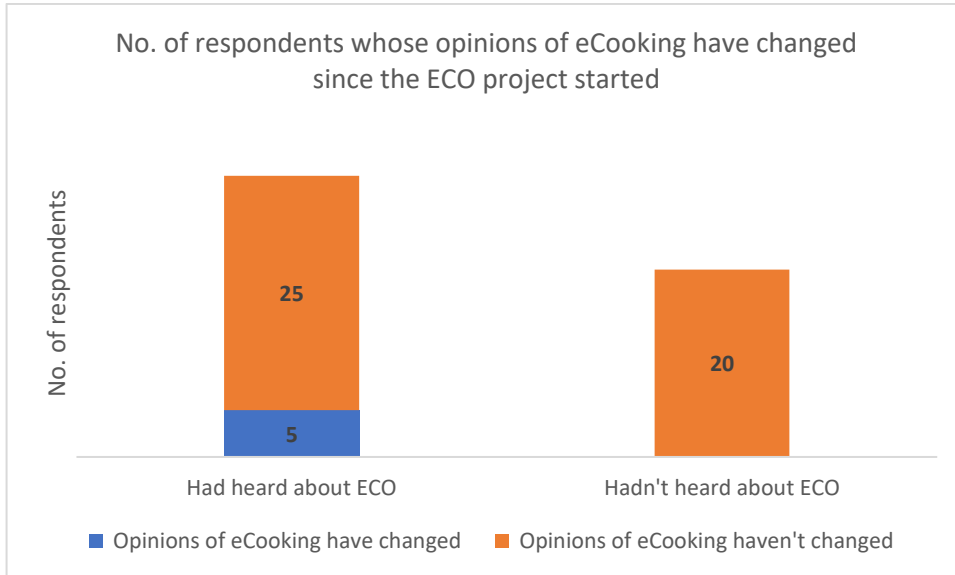


Figure 13: No. of respondents whose opinions of eCooking have changed since the ECO project started

Figure 13 shows that among the 30 households who knew about the original ECO project, 5 households responded of having their opinions of eCooking changed since the start of the ECO project. These 5 respondents also mentioned that their opinion became more positive towards eCooking after knowing that the foods cooked in the eCookstoves taste better, take less time and are cheaper compared to LPG. Although the advantages of electric cooking were highly perceived, none of the 50 households were using any electrical cooking appliances and responded that there has not been any change in their cooking practices since the start of the ECO project (see Figure 14).

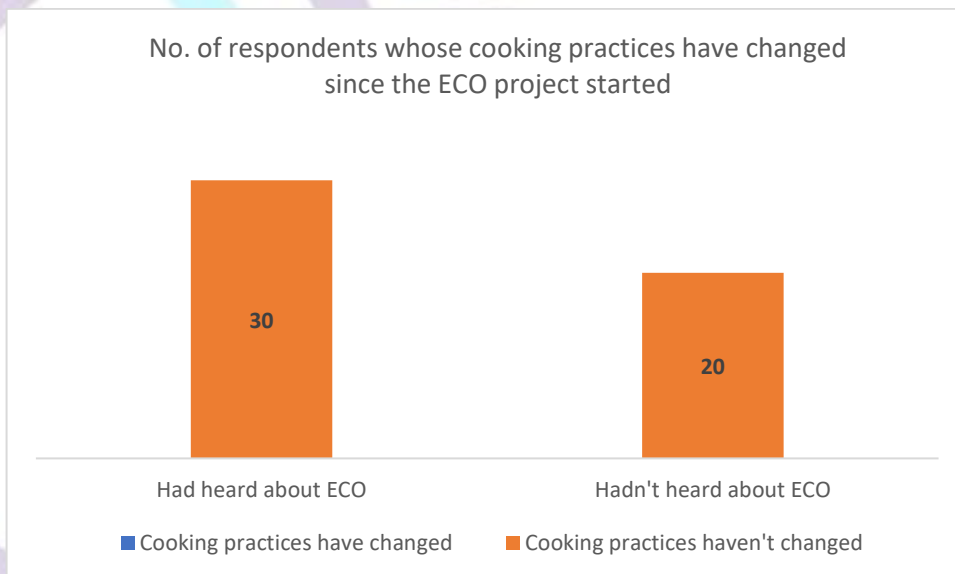


Figure 14: No. of respondents whose cooking practices have changed since the ECO project started

The highly positive perception of eCooking and few changes in the opinions of the respondents may have been caused by various factors. In the digital world, they could have heard/seen it through radio, tv, mobile, etc. or through their family members and friends. However, taking into consideration that the ECO study was the only electric cooking related project in the study area, it is very much likely that the eco project may have influenced the perception and changes to some extent.

### **Have any ECO non-participants started using eCooking appliances or expressed an interest to do so in the last year?**

None of the 50 non-participants reported of using any eCooking appliances in the last year. Out of these 50 households, 49 of them expressed their interest in purchasing eCooking appliances. Interestingly, all of the 49 households showed interest in purchasing the Electric Pressure Cooker. This could suggest that either the respondents do not have knowledge about other electric cooking appliances or the word-of-mouth publicity of the EPCs is quite positive in the area. Alternatively, the respondents might have thought that they would get an EPC (free/subsidized) as the ECO participants did during the original ECO project.

### **What are the opportunities and challenges for non-participants to start using electric cooking?**

The non-participants' survey highlights a very positive perception of electric cooking. They are aware of the various benefits of cooking on electricity and have also expressed their desire to own an EPC. The findings indicate that the ECO project has been successful in increasing the knowledge of the local people regarding the benefits of electric cooking, particularly of EPCs, which were not present in the community before the pilot. Similarly, family members and families have been giving positive feedback on the electric cooking. These all show that the environment to start using electric cooking for non-participants is generally favourable.

The government of Nepal through the Alternative Energy Promotion Centre (AEPCC) funded by the Green Climate Fund (GCF), has set a target of reaching 500,000 households to adopt electric cooking as a primary fuel for cooking in the 150 local governments of 22 Terai districts of Nepal. The Katahariya municipality is also one of the target areas for the GCF program. The knowledge developed by the ECO project could be helpful in generating interest among the local people to adopt the eCooking appliances that may become available, leading to further outscaling of electric cooking in the area.

The non-participants are currently cooking on LPG and firewood. The priority of LPG as the main choice of fuel for most households shows that they are leaning towards cleaner fuels. Since most households purchase firewood for almost half of the year's consumption, the amount they spend on purchasing firewood can be used to purchase electric cooking appliances. Similar is the case with LPG.

Figure 15 shows that 100% of people prefer to make self-decisions rather than listen to others with any purchase of electric cooking. However, 78% agreed that the positive evaluations and suggestions from others would influence their decision positively whereas only 12% responded that the negative evaluations and complaints from others would influence their decision to purchase. Similarly, 98% of the respondents agreed that they value the opinions of people inside the community rather than those outside the community with any purchase of electric cooking appliances.



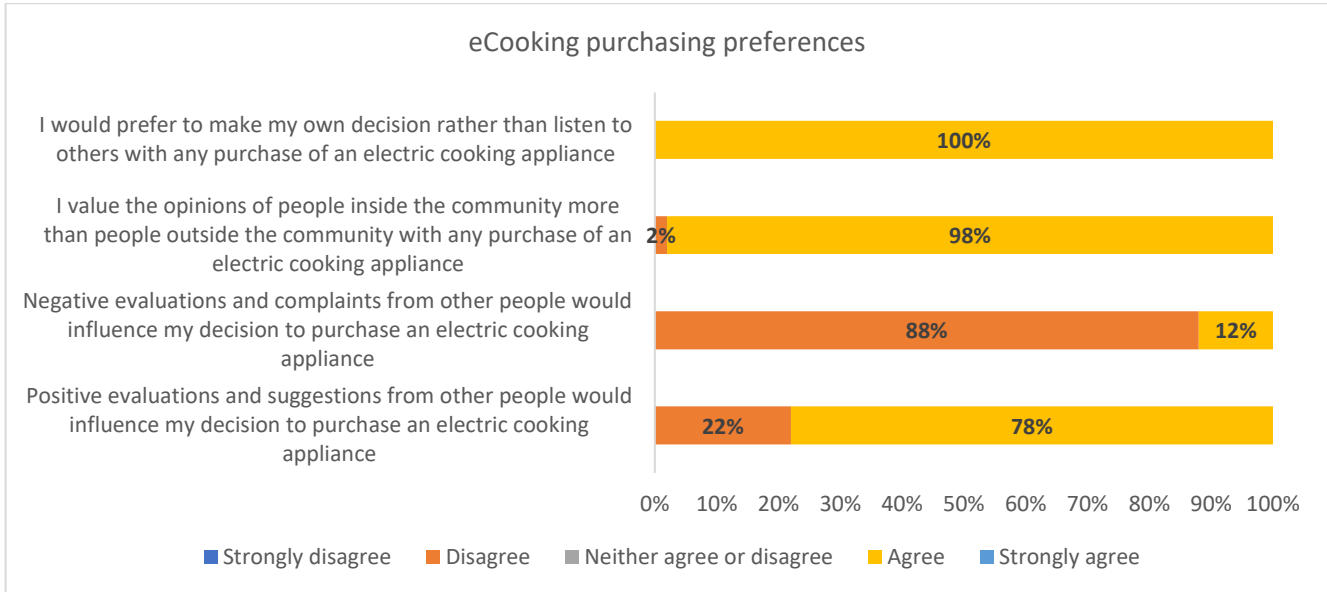


Figure 15: eCooking purchasing preferences

The main challenge for the adoption of electric cooking appliances seems to be its high upfront cost as responded by 1 respondent 'financial problem', 18 respondents mentioned 'waiting for free distribution', and 19 respondents said, 'waiting for subsidy/ price discount'. One person mentioned being unaware of where to purchase while 10 people cited a lack of information regarding the cost and benefit of the appliance. Figure 16 shows the different reasons the non-participants stated for not buying the EPC yet.

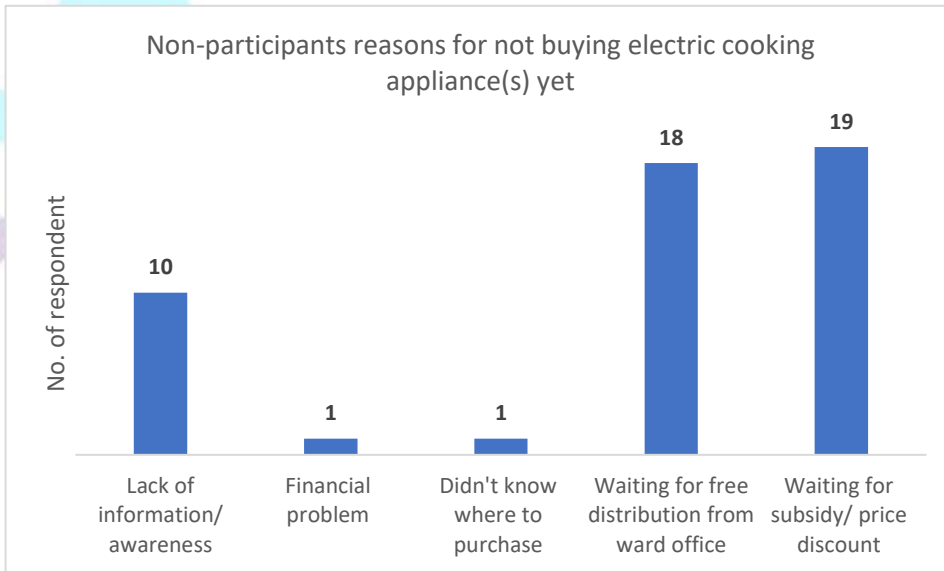


Figure 16: Non-participants reasons for not buying electric cooking appliance(s) yet

Besides the challenges mentioned by the non-participants, the study team also thinks that the unavailability of local repair and maintenance services is also a challenge for the adoption of electric cooking. The ECO participants who are having technical issues with their EPCs mentioned during the interaction visit that due to unavailability of local repair and maintenance service, they were unable to fix the problem and are unable to use the EPCs.

## Concluding summary

Overall, the non-participant survey showed that the benefits of EPC have reached beyond the ECO-participants to the community level. Most of the non-participants perceive electric cooking to be cheaper, safer, and easier to operate and the foods cooked with electricity taste better.

## What are the emerging opportunities and challenges more broadly regarding the adoption and use of electric cooking in the community?

### Opportunities

- People are aware of the benefits of cooking in EPC.
- People are ready to upgrade and adopt cleaner fuels as suggested by the increased use of LPG.
- Even the non-participants have expressed their willingness to purchase an EPC.
- Large Government initiation to promote electric cooking with GCF funding with the possibility of a subsidy/cost-sharing.
- Financial institutions providing credit facilities to cover upfront costs.

### Challenges

- Lack of financial capability to pay the upfront cost of the electric cooking appliances.
- People waiting for free distribution or high subsidy or price discount.
- Lack of local after-sales service and unavailability of spare parts.
- Lack of reliable electricity for large-scale adoption of electric cooking.

## III. Out scaling electric cooking

### What are the ways in which the ECO pilot studies could serve as launchpads to 'out scale' eCooking in the community and its surroundings?

ECO pilot studies conducted in different parts of the country by various organizations have raised awareness and knowledge on the benefits of electric cooking, particularly of EPC. In Nepal, when all government efforts are concentrated on promoting induction cookstoves, MECS has introduced a very efficient electric cooking appliance in EPC. The ECO pilot study conducted in Katahariya municipality of Rautahat district was a pioneer in introducing any form of modern electric cooking appliances. Although there were few rice cookers in the area, people did not like the taste of rice cooked in it. With the introduction of EPC, people liked the taste of foods cooked in it and thus they continuously cooked in it. Besides, the users also realized the economic benefit of cooking in the EPC. This generated interest in electric cooking in the area. The lessons learned from the ECO pilot study and the subsequent follow-up can be used to out scale eCooking in the community and its surroundings.

### Strengthening the supply chain of electric cooking appliances including after-sales service

At present, the supply chain of electric cooking appliances is concentrated in major cities only. To make electric cooking accessible to all, different electric cooking appliances should be made available in the local market. The absence of local after-sales service has become a concerning factor hindering the widespread adoption of electric cooking. In our study, a few of the EPCs are broken and the users are

not able to repair the devices. Similarly, spare parts for electric cooking appliances are also not very common even in the urban markets.

### **Enhancing Financial access**

The upfront cost of purchasing a new electric cooking appliance is comparatively higher for low-income households. Banks and other financial institutions should be encouraged to provide credits to low-income households to bear the upfront cost of the technology. Similarly, the government can support financial institutions by providing soft loans to vendors in easy installments so that they can spread their supply chain network and make the appliances available in local areas.

### **Reliable electricity supply and tariff**

Nepal Electricity Authority should strengthen its transmission and distribution lines including substation and transformer capacity in order to provide a reliable electricity supply throughout the country. Grid reliability is one of the prerequisites for the widespread adoption of electric cooking. A reliable electricity supply will create confidence among users to practice electric cooking. To encourage people to use electric cooking, tariff revision by providing some incentives could be beneficial. The tariff is set flat throughout the day. One criticism of promoting electric cooking is that it will further increase the peak demand. With the introduction of a differential tariff system through time-of-day meter, the public can be encouraged to cook beyond peak hours.

### **Market availability of quality products and enforcement of standard**

Electric cooking appliances of different brands and models are available in the market. Although the Nepal Bureau of Standard and Metrology (NBSM) has created standards for some electric cooking appliances, there are no provisions for restricting low-quality appliances.

### **VAT reduction or exemption in electric cooking appliances**

Although the Nepal government has reduced import tax on some of the electric cooking appliances, the provision of 13% VAT still makes the appliances expensive. The Government can reduce or exempt VAT for some years to promote electric cooking.

## 4. Conclusion

The ECO follow-up study carried out after a year of the ECO pilot study has shown partially sustained use of EPCs in ECO-participant households. When compared with the endline phase of the original ECO study, the percentage of heating events per fuel at dish level was found to be decreased for both the DAG and General households from 15% to 12% and 17% to 13% respectively illustrating the partially sustained use of EPC over the time. During the follow-up study, a massive increase in LPG use was found from 23% to 66% in DAG households and 38% to 73% in General households with a huge decline in firewood use from 62% to 23% in DAG households and 45% to 15% in General households indicating the shift towards cleaner fuel option. Although LPG is costly compared to biomass, lack of dry firewood and heavy workload during wet season also influenced people to prioritize speed and convenience over cost.

The perception of non-participants towards electric cooking shows that the benefits of cooking in EPC have reached beyond the participant households to the community level indicated by the views of non-participants that they think electric cooking is safe, less expensive, easy to cook and food tastes better when cooked in electricity. Almost all of the ECO-participants and non-participants surveyed during the follow-up have expressed a desire to purchase additional/new EPC which shows that the people liked the EPC. The positive feedback on the EPC from family, friends, and others made the non-participants interested in buying EPC implying that the peer-to-peer awareness raising is very impactful in generating interest.

The ECO pilot study has increased awareness of the benefits of electric cooking. However, the study has found some challenges required to overcome for the outscaling of electric cooking in the community and surrounding areas. The majority of the ECO-participants and non-participants have mentioned that the upfront cost of the electric cooking appliances is high and due to their lack of financial capability, they are either waiting for free distribution or looking for high subsidies or heavy discounts. Besides, the ECO participants have also expressed concern about lack of local repair and maintenance service and the unavailability of spare parts.

## 5. Recommendation

- Launch mass awareness campaigns to educate the public about the benefits of electric cooking, such as reduced indoor air pollution, health benefits, and lower long-term costs.
- Make availability of electric cooking appliances and spare parts in the nearest local market.
- Offer financial incentives and subsidies to make electric cooking appliances more affordable for consumers, especially in rural areas or for low-income households. Reduction or exemption of VAT and import duty in electric cooking appliances for a few years.
- Encourage banks and Financial Institutions to provide credits to low-income households to pay the upfront cost of electric cooking appliances.
- Invest in expanding the electricity infrastructure to ensure a reliable power supply, particularly in rural areas where electricity access might be limited. Support rural low-income households in their meter upgrade.
- Offer training programs to local electricians and technicians for the installation and maintenance of electric cooking appliances. Women, youth, and people from marginalized groups should be given priority.
- Encourage research and development efforts to create affordable and efficient electric cooking appliances tailored to the specific needs and cooking habits of Nepali households.
- Encourage early adopters of electric cooking to share their experiences with friends and family, as word-of-mouth recommendations can be influential.
- Seek support from international organizations and donor agencies to fund and implement electric cooking promotion programs.

### Dissemination Plan

The final report of the study will be shared through social media, and study information will be made available on the official web portal of MECS and Environment Protection Centre.