



Final Report

Efficient Electric Cooking Market Uptake in Nepal (EECMU)
December 2021



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ACRONYMS

ABF	Ajjummary Bikash Foundation
ADB	Asian Development Bank
AEPC	Alternative Energy Promotion Centre
CBO	Community Based Organization
CCA	Clean Cookstove Alliance
CES	Centre for energy Studies
CI	Confidence interval
DAG	Disasdvantaged Group
DOED	Department of Electricity Development
EC	Electric Cooker
EECMU	Efficient Electric Cooker Market Uptake
EPC	Electric Pressure Cooker
ERC	Electricity Regulatory Commission
EU	European Union
FCDO	Foreign, Commonwealth and Development Organization
GHG	Green House Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HH	Household
IOE	Institute of Engineering
JICA	Japan International Cooperation Agency
LPG	Liquified Petroleum Gas
MCB	Miniature Circuit Breaker
MCC	Millennium Challenge Corporation
MECS ECO	Modern Energy Cooking Services Electric Cooking Outreach
MFI	Micro Finance Institution
MOEWRI	Ministry of Energy, Water Resources and Irrigation
MOPID	Ministry of Physical Infrastructure and Development
NACEUN	National Association of Community Electricity Users Nepal
NAMA	Nationally Appropriate Mitigation Ambition
NBSM	Nepal Bureau of Standards and Metrology
NEA	Nepal Electricity Authority
NGO	Non-Government Organization
NMB	Nepal Merchant Bank
NPC	Nepal Planning Commission
NPR	Nepali Rupee
NREP	Nepal Renewable Energy Program
PEEDA	People, Energy and Environment Development Association
RECON	Renewable Energy Confederation of Nepal
REPSO	Renewable Energy Program Support Office
RERA	Renewable Energy for Rural Areas
REWSSPC	Renewable Energy, Water Supply and Sanitation Promotion Centre
SDC	Swiss Agency for Development and Cooperation
UK	United Kingdom
UNDP	United Nations Development Program
USAID	United States Agency for International Development
WB	World Bank

Executive summary

Winrock in collaboration with Renewable Energy, Water Supply and Sanitation Promotion Centre (REWSSPC) has conducted a study on “**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 overall objective of the study is to gather and disseminate information to increase adoption of Electric Pressure Cookers (EPCs) and their impact on load management and grid design. The specific objectives include:

- To determine consumer’s preference on the use of EPCs, willingness to pay, preferred business models, economic benefits of EPCs, and impacts of EPCs on existing electricity infrastructure and suggest required strengthen measures
- To expand knowledge of wider stakeholders on EPC and its benefits
- Policy advocacy for scaling up EPCs and viable business/financial models.

The pilot study had been conducted in wards 2 and 3 of Katakariya Municipality of Rautahat district. Availability of grid connection, peri urban community with LPG facility in most households, and municipality’s willingness to promote electric cooking were the reasons for piloting in the area. Altogether 50 households were selected in collaboration with the municipality, of which 20 households belonged to Disadvantaged Groups (DAG) (households that belonged to minority groups or economically poor households). The reason for selecting disadvantaged group was to study the difference in their preference to EPC use in comparison to other households, which would be useful in guiding whether EPC can penetrate in low-income households or not. The project had provided a subsidy of 40% of the EPC cost to the general households whereas 80% subsidy was provided to DAG households. Municipality provided 20% of the remaining cost and the households contributed the rest.

The study consisted of six different phases. Set up phase included assessment of available EPCs in Nepalese market and selection of EPC, consultation meetings with local stakeholders, orientation and demonstration events, selection of households, enumerator’s training, and baseline survey. Similarly, data collection was conducted in 5 phases (Baseline, Transition, Monitoring, Endline and Exit Survey). Baseline phase by using Cooking Diary-Intensive method of 3 weeks was used to collect data on existing cooking practice of the households. The households were then provided with safety training before handing over the EPCs followed by adaptation break. Transition phase (Cooking Diary Intensive) began after the adaptation break and lasted for 4 weeks. A monitoring phase (Cooking Diary- Light) of 12 weeks were carried out where only the meals cooked in EPC were recorded. Endline phase of 2 weeks by using Cooking Diary Intensive method was carried out to observe any change in cooking behavior after almost 4 months of using EPC. Last phase of the data collection was an exit survey which mainly recorded the qualitative information on the likes and dislikes of EPC as perceived by the users along with their willingness to purchase and the amount they could afford to buy a new product on their own. The project also developed a video documentary with case studies of some selected households to show the impact of EPC in their households. Two dissemination workshops were conducted, one at local level (Katakariya municipality) and one at provincial level (Janakpur). The remaining National level workshop will be jointly conducted in collaboration with Practical Action and PEEDA.

Firewood was found to be the most used cooking fuel in both the general and DAG households during the baseline phase followed by LPG with electricity not used. After the introduction of EPC in the transition phase, the percentage of heating events at dish level using electricity increased to 25% for DAG households and 20% for general households. Use of EPCs resulted in the percentage of heating events using firewood exclusively decreasing from 64% to 42% for DAG households and 53% to 46% for general households. Similarly, the share of heating events using LPG exclusively reduced from 34% to 19% for DAG households and 45% to 23% for general households while the use of EPC exclusively increased to 12% for DAG households and 10% for general households. Monitoring phase was conducted for 12 weeks, and it was found that the 34% of all heating events during the monitoring phase consisted of EPC. For DAG HHs, the two-week endline phase saw electric cooking declined to 15% of heating events at dish level and was mainly replaced by increased firewood use (62%). The endline phase for general households differed: firewood use continues to fall (45% of heating events at dish level) while there was only a slight decrease in the use of EPCs (17.5%), with both fuels replaced by LPG which rose to 38%. The main reasons for reduced EPCs use in the endline phase were a lack of local service centres to repair reported EPC faults and the endline phase coinciding with festival season which required larger amounts of food to be cooked that were beyond the capacity of the EPC.

In terms of fuel stacking, EPCs were far more commonly used in combination with firewood (23% of all heating events) than with LPG (4% of heating events), which indicates that EPC might be more suitable to replace LPG rather than biomass, which is most of the times available for free of cost.

All of the households had 5 Ampere connection and that was found to be suitable for running EPC because EPC do not consume continuous electricity during its operation. The average voltage in the households was found to be lower than standard 220 V. However, almost 80% of the records has shown the voltage level of above 185 V. The specification of the EPC says that the device can run between the voltage 185-250. The voltage in the morning was slightly higher than that in the evening. The households did not report in any instance that the low voltage had deprived them from using the EPC.

The study has shown EPCs to be the most efficient fuel in terms of energy consumption and cost incurred when compared for different dishes. Overall, cooking in EPC was almost half the cost of cooking with LPG and over five times cheaper than cooking with purchased firewood. All dishes except lentil soup were reported to have taken lesser time when cooked in EPC than those cooked in LPG and firewood.

Rice was found to be the most cooked dish in the EPC followed by vegetable curry and lentil soup. Out of all the dishes cooked in EPC; rice, vegetable curry and lentil soup accounted for 54%, 22% and 19% in Transition phase, 66%, 17% and 15% in Monitoring phase, and 52%, 27% and 19% in Endline phase respectively. The study also showed that not all staple dishes can be cooked in the EPC, for e.g., EPC is not suitable for preparing chapati. Also, the dishes that require deep frying were rarely cooked using EPC. EPC was also not found to be suitable when the households had to cook dishes for large number of people, especially at festivals. EPC was found to be easy to handle by younger generation/students whereas it was found to be difficult to operate by the elderly. Due to lack of local service centre, the EPCs that encountered with technical issues had to be sent to Kathmandu and it took few weeks to - repair and send them back which resulted in lower use of EPC in the Endline phase. Despite some drawbacks, almost 85% of the DAG households and 90% of general households expressed their willingness to purchase EPC in future during the exit survey.

In conclusion, the households have realized the benefits of EPC over LPG and biomass stoves and want to continue using the device. At this stage, the EPC enables some cooking to be transferred to electricity but does not seem to completely replace the LPG or biomass stoves fully. The need for local service centres to handle maintenance and repairs is critical for increasing household confidence in EPCs and enabling a greater shift to eCooking.

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1. Background and Rational of the Project

Around 3 billion people utilize biomass for cooking on a global scale. Traditional cook stoves have had a negative impact on people's lives in a number of ways including harmful emissions of black carbon and other particulates, indoor air pollution, the loss of productive time spent gathering fuel that could be spent on income-generating activities or improving quality of life, deforestation due to over-harvesting of fuelwood and increased greenhouse gas emissions. On the other side, despite appeals from a variety of global and national programs such as Sustainable Energy for All, Sustainable Development Goal 7 and Clean Cooking Solutions for All for affordable and reliable access to modern energy and the promotion of clean cooking, progress in clean cooking access remains slow. The strong reliance on traditional fuels and cooking technologies in underdeveloped countries like Nepal is a sustainability concern because of its multiple consequences on numerous dimensions of development.

Furthermore, we need to acknowledge that there has been an increasing trend of switching from traditional fuels to LPG in recent days. With the rise in the socio-economic level of households, switching from inferior traditional fuel to superior fuel like LPG is becoming more common, particularly in urban and peri-urban areas. This is determined by physical attributes such as cleanliness, cooking speed, convenience of use, and cost effectiveness. Households' reliance on LPG for cooking, which is entirely imported, has grown over time putting a financial strain on the government. In the recent decade, annual LPG imports have increased by 15% on average, causing significant negative effects on our economy. As a result, the clean cooking sector is increasingly shifting its focus away from traditional fuels and/or LPG and toward cleaner cooking fuels like electricity and biogas. As policymakers, civil society organizations, and development partners become more interested in cleaner cooking fuels, new opportunities for the promotion of e-cooking systems are opening. The Government of Nepal's vision of "smoke-free kitchen communities"¹ will not be fulfilled unless most families switch to e-cooking. Switching from traditional fuels and LPG to e-cooking in the domestic sector, employing the country's rich water and solar resources, is critical for the country's economic sustainability and energy security. According to a study conducted among selected households in Mandan Deupur Municipality, cooking on electric induction stoves was found to be almost 40% cheaper than cooking on LPG (Bajracharya, 2019). Another lab-based study conducted by the Centre for Energy Studies (CES, IOE) showed a 42% saving on fuel cost when cooking on induction stove compared to cooking using LPG (Shrestha, 2020).²

While addressing the inefficient use and health and economic implications of prevailing cooking practices, the probable electricity surplus scenario of the country together with an ambition to reduce LPG use, makes e-cooking a viable solution. In this context this study has been initiated to study the prospect of transition to clean cooking with the introduction of electric pressure cooker (EPC). The study will support in determining consumer's preference on the adoption of EPC, willingness to pay, preferred financial mechanism and the impact of EPC's use on the existing electricity infrastructure, which will then contribute to providing a basis for policy advocacy for scaling up EPCs and shaping viable business/financial models.

¹ Government of Nepal, National planning commission, *The Fifteenth Plan (Fiscal Year 2019/20 – 2023/24)*

² *Assessment of Electric Cooking Targets for Nepal's 2020 Nationally Determined Contributions (NDC)*, Ministry of Forests and Environment, March 2021.

2. Introduction

2.1. Electric Cooking

Promoting electric cooking is important in Nepal for two main reasons. First, due to many hydroelectric projects that are likely to be commissioned in the near future, Nepal's electricity production is expected to expand dramatically in the coming days. Second, many energy economists and policymakers believe that petroleum imports are one of the primary causes of Nepal's trade deficit. Also, it has been stated that simply replacing Liquefied Petroleum Gas (LPG) with electricity for cooking can significantly alleviate the country's trade deficit. Electric cooking is smokeless and does not cause indoor air pollution or subsequent respiratory diseases. Electricity in Nepal is mostly hydropower generated from run off river and are considered renewable source of energy. Therefore, electric cooking also reduces carbon dioxide emissions. Additionally, studies have shown that cooking on an efficient electric appliance is less expensive than cooking on traditional cookstoves or LPG cookstoves³.

In Nepal, there is currently an enabling atmosphere for transitioning to electric cooking. The Government of Nepal (GoN) has launched the 'Universal Access to Clean Cooking Solutions by 2030' program in order to provide electricity to the entire population. Because of the improved generation and dependability of electricity supply in recent years, which is a prerequisite for electric cooking, interest in electric cooking is growing. The national grid's electricity supply is becoming more stable, allowing homes to rely more on electric cooking. Additionally, recently the government has slashed electricity tariff so as to increase the domestic consumption of electricity. The use of electric cookstove, on the other hand, has grown at a slower rate than expected. Lack of awareness about electric cookstoves and their benefits, an underdeveloped supply chain, including after-sales services, cultural cooking preferences, skepticism of newer products, and the high upfront cost of efficient electrical cooking appliances are some of the barriers to widespread adoption of these technologies for cooking in Nepal.

There are different types of electric cooking appliances readily available in the market such as electric rice cookers, hotplates, infrared stoves, induction stoves and Electric Pressure Cookers (EPCs). However, this project has chosen EPCs for the pilot study. EPCs are more efficient due to faster cooking times and lower heat loss compared to induction stoves. Although EPCs have high upfront cost, low operating cost make them cheapest option in long run. This project intends to research on the consumer's preferences for EPCs, willingness to pay, preferred business models, economic benefits of EPCs, and impacts of EPCs on existing electricity infrastructure and required improvements. The electric pressure cooker (or multicooker) is an appliance that is a combination of an electric hotplate, a pressure cooker, and an insulated hotbox with a fully automated control system. It has three components: inner pot, cooker base, and lid. An EPC cooks using high pressured steam within a sealed insulated pot. This has two major advantages; the high-pressure steam raises the boiling point of the water inside the cooker which together with the sealed insulated pot ensure faster cooking. Secondly, it allows the EPC to consume significantly less energy than other electric cooking appliances, making it less expensive to operate.

2.2. About the Project

Winrock International has been working in Nepal to increase access to clean energy through public awareness raising and capacity building since the establishment of Renewable Energy Program Support Office (REPSO) in 1997. Through the work of the Clean Energy Group

³ https://www.mofe.gov.np/downloadfile/E-cooking%20Assmnt_NDC%202020_1623998059.pdf

(CEG), renewable energy projects are bringing modern energy services which also includes clean cooking technologies to help in the development of healthy and safe kitchens for millions of people.

The Modern Energy Cooking Services Electric Cooking Outreach (MECS) is funded by UK Aid through the Foreign, Commonwealth & Development Office and is led by Loughborough University, UK. The Modern Energy Cooking Services Electric Cooking Outreach (MECS ECO) Challenge Fund enables MECS to fund research projects via two themes – 1. community scale pilot studies and 2. market assessments – to facilitate the greater uptake and understanding of opportunities for the use of efficient electric cooking appliances. Under this initiative, Winrock International has been awarded a grant for an ECO theme 1 project named: "Efficient Electric Cooking Market Uptake in Nepal (EECMU)".

The Renewable Energy, Water Supply and Sanitation Promotion Centre (REWSSPC) is a registered company situated at Chandranigahpur-4, Rautahat in Province 2 that seeks to promote the dissemination of renewable energy technologies and the sustained functioning of water supply and sanitation infrastructure through private sector engagement. REWSSPC targets all 8 districts of Province 2 (Parsa, Bara, Rautahat, Sarlahi, Mahottari, Dhanusa, Siraha, and Saptari) with district-based staff and a coordinating office in Chandranigahpur (Chandrapur), Rautahat. REWSSPC has noteworthy experience of promoting clean cooking technologies including e-cooking based in Terai through different National and International projects.

Winrock International Nepal, in collaboration with the REWSSPC, implemented the Project EECMU in Katahariya Municipality, Province 2 of Nepal, to assess the prospects of households transitioning from traditional and/or fossil fuel to e-cooking options through a viability study of e-cooking solutions in Nepal.

The overall objective of the project was to determine consumer's willingness to pay for and acceptability of EPCs in Nepal. The specific objectives were to:

- Determine consumer's preference on the use of EPCs, willingness to pay, preferred business models, economic benefits of EPCs, and impacts of EPCs on existing electricity infrastructure and suggest required strengthen measures.
- Expand knowledge of wider stakeholders on EPC and its benefits.
- Carry out policy advocacy for scaling up EPCs and viable business/financial models.

Specifically, the project has the following outcome indicators as a benchmark for measuring project outputs.

- Number of consumers showing interest in transition to e-cooking
- Consumers' willingness to pay for the appliance
- Economic and social benefits of using EPC as perceived by the consumers
- Interest of local government and/or local government agencies to promote e-cooking
- Status of the existing electricity infrastructure for up-taking EPC cooking and government's plan to meet the gap

3. Approach and Methodology of the Project

3.1. Phases of Study

The research study has adopted three phases of study namely, set-up phase (including baseline survey), data collection phase and dissemination & outreach phase. Based on these phases, various activities and the respective parameters are assessed throughout the project period. Semi structured questionnaire survey was used during baseline survey and endline survey. Similarly, cooking diaries method were used during data collection phase. The data collection phase was further divided into baseline phase, transition phase, monitoring phase, endline phase and exit survey. Cooking diaries method were used during baseline, transition, monitoring and endline phases. Two types of cooking diaries (intensive and light) were used. Intensive cooking diaries approach was used during baseline, transition and endline phases where the records were collected for all kinds of foods cooked in all kinds of stoves whereas Light cooking diaries approach was used during monitoring phase where the records were collected only for the dishes cooked in EPC.

A mix of survey tools was used to collect the data required for the survey. Both quantitative as well as qualitative data collection methods were used. The tools were designed to ensure that all the information required for analyses were captured.

The tools included were:

- 1) Household questionnaire. The tool was a semi-structured questionnaire used in all the sampled households. Data collection was carried out using smart phones. The phones were installed with KoBoToolbox⁴ application. Data collected were uploaded to a cloud server upon completion of the interview (in areas with internet connection) or saved on the phone then uploaded as soon as the enumerator was within an area with a connection.
- 2) Informal consultations were done to capture the views of individuals with relevant experience in improved cooking interventions in the clean cooking sector. The key informants were drawn from the various sector stakeholder groups including local government officials, service providers, financing institutions and civil society organizations.

The Figure 1 below shows the different phases of the pilot study.

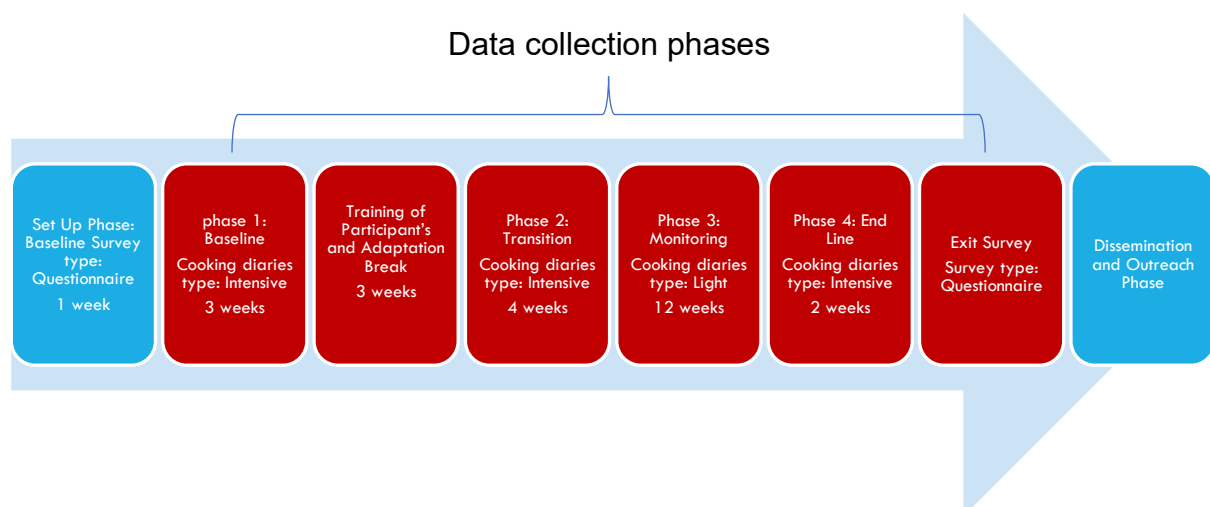


Figure 1 Different phases of the pilot study

⁴ Its free data collection tool. Details <https://www.kobotoolbox.org>

The data collection at different phases was carried out as indicated in **Error! Reference source not found.**

Table 1 Details of the 4 phases of study

Phase	Details	Type	Start	End
Set Up Phase	Market study, stakeholder consultation, awareness, and demonstration activities	Questionnaire survey	07-2020	03-2021
Data Collection Phase	Cooking Diaries Baseline phase including baseline survey	Intensive	04-04-2021	04-25-2021
	Cooking Diaries Transition phase	Intensive	06-28-2021	07-25-2021
	Cooking Diaries Monitoring phase	Light	08-03-2021	10-25-2021
	Cooking Diaries Endline phase	Intensive	11-1-2021	11-14-2021
	Exit Survey	Questionnaire survey	11-16-2021	11-17-2021
Dissemination & Outreach	Local, provincial, and national level workshops (National level workshop postponed due COVID-19)	Video Documentary, Dissemination workshops, Final Report	11-18-2021	12-31-2021

3.1.1. Phase 1: Set-Up Phase

The set-up phase conducted following activities:

Baseline /registration survey of existing cooking practices

The baseline study of the existing cooking practices was done to establish a benchmark for the implementation of the project. The information generated from the baseline provided points of reference for the planning of the next phase of study, target setting, monitoring, and evaluating change during and after project intervention as well as impact assessment.

Semi-structured questionnaires were used in all the sampled households for the baseline/registration survey with the use of KoBoToolbox⁵ application. The baseline survey studied the 1) characteristics of respondents while preference of the respondent selected was given to the household members directly involved in cooking and budgeting for cooking, 2) household configuration, orientation patterns and economic standing, 3) financial status and dominance in financial decision makings to gain a rough idea about the families purchasing capacity of EPC, 4) present use of fuel and procurement practice, 5) use of cooking appliances and procurement practices, 6) smoke exposure odds in the kitchen, 7) electricity system status of the project area, and 8) perception of EPC among the respondents based on the orientation and demonstration events conducted prior the baseline survey. The questionnaire was prepared in KoBoToolbox and can be accessed from the link below.

<https://kobo.humanitarianresponse.info/#/forms/a9EW3hnDE3zEaD4RgUxaHn>

Market analysis of available EPCs in Nepal

The project team carried out market assessment with suppliers identified through different internet portals, telephonic conversation with identified suppliers of different brands, visiting distributors and collecting information from other awardees such as PEEDA. After several rounds of consultation and discussion with Research Coordinator of MECS program and with Researcher from PEEDA, the team procured GEEPAS brand of EPC out of the 4 CE certified EPCs available in the market. GEEPAS has a very reasonable price compared to another

⁵ It is a free data collection tool. Details <https://www.kobotoolbox.org>

brand. One-year warranty was also provided by the company. GEEPAS was also recommended over Kenwood by PEEDA for its efficiency and safety features.

Stakeholders' consultation

Consultations were done to capture the views of individuals with relevant experience in improved cooking interventions in the clean cooking sector. The key informants were drawn from the various sector stakeholder groups. Series of virtual meetings were conducted with the Mayor of the Katahariya municipality, where the mayor acknowledged the benefits of the EPCs with queries regarding transformer capacity and the price of the EPCs. The mayor provided written commitment to provide financial subsidy to the intervention households to purchase the EPC.

Meetings were carried out with Ward Chairpersons of wards 2 and 3 of project location and Assistant Forest Officer of Division Forest Office, Rautahat. The project team also conducted a virtual meeting with the Centre Chief of Maulapur Distribution and Consumer Services of Nepal Electricity Authority to inform him about the project activities and discuss on the quality of electricity in the pilot area. It was informed during the meeting that the capacity of the transformers and the voltage levels in the area are sufficient to handle the additional load of 50 EPCs. The Centre Chief further expressed his commitment in providing required support in terms of electricity supply and upgradation of miniature circuit breakers (MCBs) in the intervention households if required. Meeting was also conducted with officials from Infinity Laghubitta (local micro finance institution) regarding the possibility of credit options, if required, for households to bear the upfront cost of purchasing EPC.

Production of learning materials and booklets

Learning materials and booklets were produced for distribution among the potential participants during EPC awareness, orientation, and demonstration events.

“Electric Pressure Cooker User Guidebook” talks about the types, advantages, limitations, operation & maintenance, and safety features of EPC. It also gives the recipes for common food/meals that can be cooked in EPC and the EPC suppliers details. The flyer “Electric Pressure Cooker for Energy Efficient and Fast Cooking” gives basic information on EPC, cooking steps, advantages, safety measures and cleaning and maintenance of the cooker. It seems like many users did not follow the guidebook because many households were using metal spatula that had scratched the surface of the inner pot.

Awareness, orientation, and demonstration activities

Awareness, orientation, and demonstration activities were done in the pilot areas to inform local stakeholders and local community on the benefits of using EPC by disseminating information to increase adoption of EPCs. The activities basically focused on; stakeholders' consultation to expand their knowledge on EPC and its benefits, awareness raising, orientation and demonstration activities to local people (male and female) on the use of EPC. These activities increased interest of the local households for the adoption of EPCs and provided them an opportunity to try their hands on the EPC.

The enumerators were oriented on; cooking diary types, phases of data collection (baseline, transition, monitoring, and endline), recording energy measurements & cooking processes data, electric cooking training for the participants and data verification.

Following the awareness, orientation and demonstration activities, a list of potential intervention households was made. The project had decided to pilot the EPCs in 50 households of which 30 belonged to general households and 20 belonged to Disadvantaged households (DAG). The reason for selecting disadvantaged group was to study the difference

in their preference to EPC use in comparison to other households, which would be useful in guiding whether EPC can penetrate in low-income households or not. The households from general pool were selected based on early interest shown for the pilot. The households from DAG pool were selected with support from the municipality and consists of households from minority group (Dalit, Muslim, Janajati) and economically poor. Altogether 27 households were selected from ward 2 and 23 households were selected from ward 3. 10 DAG households were selected from each ward.

3.1.2. Phase 2: Data Collection Phase

Data collection phase consisted of 4 different phases along with an exit survey conducted at the end of the endline phase. Cooking diaries intensive and light methods were used for the data collection at household level. The cooking diary intensive and light forms are attached as appendix 1 and 2 respectively.

The 50 surveyed HHs were provided with cooking diary to record data after each item was cooked. The cooking diary was intended to record details on the cooking menu, appliances/fuels used, energy measurements, use of fuel stacking, cooking processes, and duration of cooking.

Cooking Diaries Baseline phase

The baseline phase began with a questionnaire survey of 50 households on their existing cooking practice. After the survey, data on daily cooking was collected for 3 weeks by using cooking diary intensive method. The enumerators were asked to collect data 3 times a day for morning, afternoon and evening meal cooked in all kinds of stoves. The data were then entered into KoboToolbox for further analysis.

Cooking Diaries: Transitioning Phase

In the transitioning phase, data was collected for 4 weeks with information on how people cooked after electric appliances were introduced. However, the participants were free to cook in any appliances/devices they found easy. Enumerators were asked to make daily visits to households to input cooking diary data onto KoboToolbox and interview participants on how they cooked.

Cooking Diaries: Monitoring Phase

For 12 weeks the participants were asked to record the data on cooking events on electric cooking appliances; time electric appliance was used, menu item cooked, and the number of people cooked for. The enumerators were asked to monitor the recorded data through weekly or bi-weekly visit and upload the data recorded by participants onto KoboToolbox. The enumerators were also asked to support the participants and help troubleshoot if any.

Cooking Diaries: Endline Phase

Initially planned for 4 weeks, the Endline phase was later reduced to 2 weeks after consultation with MECS. The participants were free to cook on any appliances/devices during the endline phase. Enumerators were asked to make daily visits to the households to input cooking diary data onto KoboToolbox.

Exit survey

A questionnaire survey (exit survey) was carried out at the end of the Endline phase to get qualitative information regarding their preference on EPC, features of EPC they liked and disliked including the benefits and disadvantages they perceived and whether they want to continue using the EPC or not and would they be willing to purchase a new EPC if needed and how much they would be willing to pay for a new EPC. The exit survey was conducted by Winrock team. The exit survey questionnaire has been sent separately as Appendix 3.

3.1.3. Dissemination and Outreach Phase

The following activities were conducted during the dissemination and outreach phase:

- Local, provincial, and national level workshops to disseminate results of the intervention.
- A video documentary has been developed to be shared during dissemination and outreach programs.
- The findings of the study and workshops as reported in this final report.

The local and provincial level workshops have been conducted at Katahariya municipality and Janakpur respectively. The proceedings of the events are sent separately as Appendix 4 and 5. The national level workshop was planned to be jointly organized by Practical Action, Winrock International and PEEDA on 21st January 2021 but had to be cancelled due to Government restriction regarding Third wave of COVID pandemic.

3.2. Equipment Provided

Of the 50 households under study in total, each household was given the following:

- 1 EPC for the pilot test



- 1 digital hanging scale was used to measure the firewood or LPG consumed per meal to calculate the energy used to cook. The fuels were measured before and after each meal.



- 1 sub meter was placed in each kitchen to measure the quantity of electricity consumed per dish.
- A multimeter was used to measure the voltage at household twice a day (morning and evening).

3.3. Financial mechanisms for EPC distribution

For the pilot study, the project and the municipality agreed to provide subsidies to the household for the purchase of the EPCs with some cost (around NPR 1000) to be borne by the consumer. Local financial institution (Infinity Micro finance) was not involved in lending

credit because it was deemed unnecessary at this stage since the consumer's share was very little. The microfinance institution was ready to lend credit beyond the project for upscaling of efficient electric cooking appliances.

The municipality also provided a letter to the local partner REWSSPC stating that the municipality will provide subsidy to the 50 EPC's purchase. The reason for asking consumer's share was to make them take ownership of the equipment and use it wisely. The financial arrangement was structured as follows:

For 30 EPCs belonging to general households:

Project Subsidy: 40%

Consumer Share: 10-20%

Municipality Subsidy: 40-50%

For 20 EPCs belonging to disadvantaged households:

Project Subsidy: 80%

Consumer Share: 5-10%

Municipality Subsidy: 10-15%

Winrock provided the total amount of project subsidy during procurement and the rest of the cost was borne by REWSSPC to be reimbursed from the municipality and the consumers. The municipality is in the process of reimbursing the cost to REWSSPC. The consumers have not paid their share because the municipality (mayor) has assured them that they will pay all the cost. Therefore, full cost recovery has not been achieved so far.

3.4. Project practicalities/logistics

Winrock International had procured 50 EPCs and handed over to REWSSPC. The Winrock project team carried out market assessment of different suppliers identified through various online portals, telephonic conversations with identified suppliers of different brands, visiting distributors and collecting information from other awardees such as PEEDA. After several round of consultation and discussion with Research Coordinator of MECS program and with Researcher from PEEDA, the team decided to procure GEEPAS brand of EPC out of 4 CE certified EPCs available in the market. GEEPAS is CE certified EPC with very reasonable price than others brand with 1-year warranty provided by the company. GEEPAS was also recommended by PEEDA over Kenwood in terms of its efficiency and safety features. The selection of GEEPAS branded EPC was made based on CE certification, availability in the market, cost, review, and warranty offered. The cost has played a vital role in the selection of the EPCs. A report on available EPCs in Nepalese market has been sent separately as Appendix 6.

The community engagement in the form of awareness raising and demonstration events were organized. Most of the attendees were women and girls. However, some orientation events were targeted to males too. The males were encouraged to witness the entire cooking and taste food cooked in EPC.

Women and men provided positive response to the food cooked in EPC during such events. The events were successful in attracting attention of men, but some females were uncomfortable to speak in the presence of men. Hence, some live demonstrations were exclusively targeted to women and few to men. Such events made them understand EPC as necessity for safe, easy, and smoke free cooking which in long run benefits health of their

women and children. The food tasting at the end of demonstrations was successful in building trust in the technology. The participants could also see the faster and safer cooking in EPC.

The team developed EPC booklet and flyer both in English and Nepali language. Nepali version was mainly targeted for the EPC users' households so that they can read and understand the essence of booklet and flyer. The booklet includes EPCs advantages, safety features, maintenance procedures and provides recipes for most popular dishes. The booklets were distributed to 50 selected households to foster deeper understanding on EPC and its uses. Likewise, flyers were distributed during orientations and awareness raising events to all participants present at the event. The EPC User's guidebook and EPC Flyer are sent separately as Appendix 7 and 8.

The training on the use of EPC at the household level were conducted to selected households and both men and women of the households were encouraged to take part in the training. After the completion of the training on its use, repair and maintenance, safety features, EPC were distributed to selected household ensuring that they have understood proper use and safety features of EPC.

Maintenance and repair- Contact information of supplier was provided in the users' guidebook. Local partner (REWSSPC) facilitated the repair and maintenance support needed. Household requiring repair and maintenance service informed the staff of local partner and they received the damaged EPC. Once the local partner received the damaged EPC, it was sent to Winrock office. As there was no local level repair center of the EPC supplier to claim the warranty, it had to be sent to Winrock office and then it was taken to the repair center of supplier based in Kathmandu, Nepal. This was not effective because it took more days to provide the repair and maintenance service to the households.

Out of 50 EPC, around 4 EPC had technical issues like damage to fuse, pressure not building inside and power cord damage. These issues were resolved after sending the EPC to repair center of EPC supplier. Another issue was removal of nonstick coat of inner pot. It happened mainly because they were using metal spatula and we asked enumerators to aware them on proper handling of the equipment.

The EPCs was procured and initially stored in Winrock's office in Kathmandu. Later, it was transported to local partner – REWSSPC office. Once the 50 households were finalized, it was distributed to the households after providing safety training. There were no issues encountered during asset management.

3.5. Study Location

The pilot community lies in Ward no. 2 and 3 of Katahariya Municipality, Rautahat District, Province 2 which lies in the terai region of the country (Figure 2). Availability of grid connection, peri urban community with LPG facility in most households, and municipality's willingness to promote electric cooking were the reasons for piloting in the area. The community in total has 1200 households with average family size of 5.5. Ethnically, the community is dominated by Madheshi followed by Tharu, Janjati, Dalit and Muslim. Firewood is the primary cooking fuel for these households followed by LPG. Cooking in the area is mainly the role of women. Rice, lentil soup, curry and chapatis are staple foods, while meat and pulses are eaten occasionally. The village has reliable grid electricity supply. The dwellers do use electrical appliances, but only a few households cook with electricity using rice cooker.

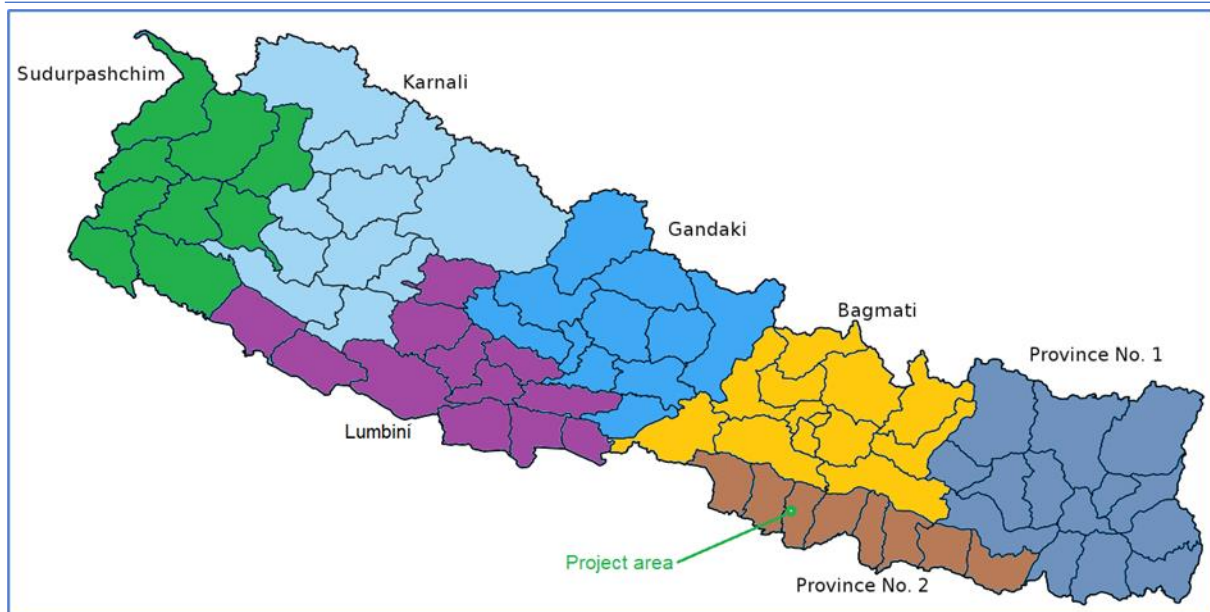


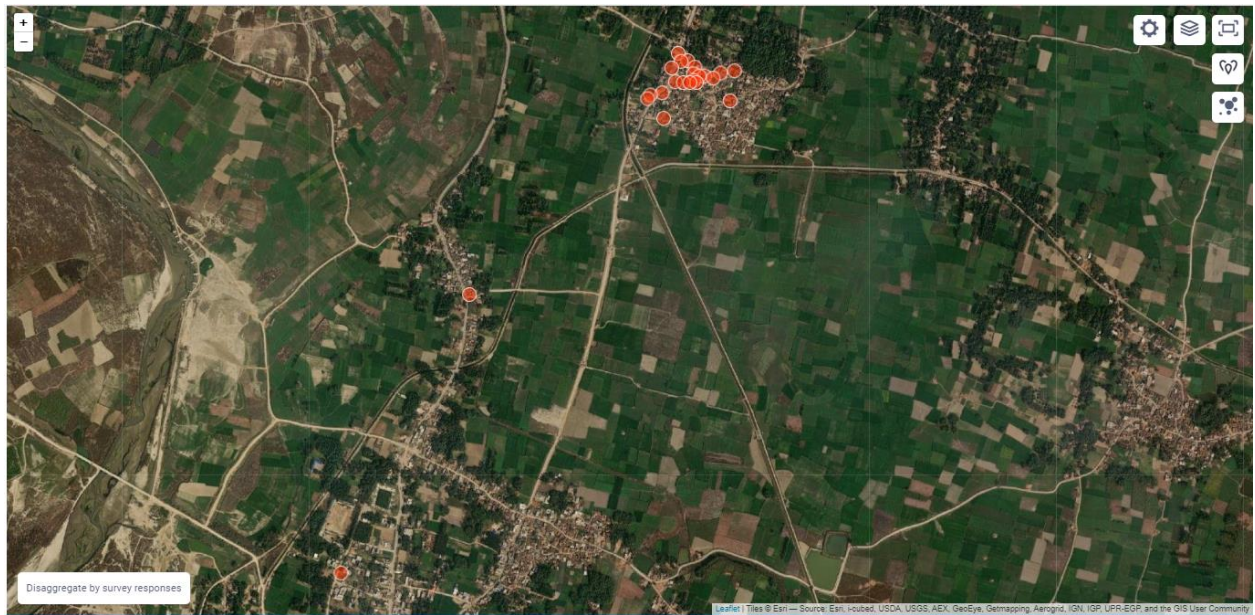
Figure 2 Project location

3.6. Household Selection

The project organized five orientation and demonstration events for the local people at different locations of wards 2 and 3 in collaboration with Katahariya municipality to raise awareness on the application of EPCs, cost and benefits of using EPCs, product demonstration and providing opportunity to try their hands on the EPC. The participants were informed about the cost of the EPC and the financial arrangements regarding the purchase of the EPC. A list of interested households were collected. A total of 50 households, 20 belonging to the DAG and 30 belonging to general HHs were then selected on the basis of early interest shown (Figure 3). The 20 households that represent the disadvantageous groups were selected in consultation with the municipality. The reason for selecting disadvantaged group was to study the difference in their preference to EPC use in comparison to other households, which would be useful in guiding whether EPC can penetrate in low-income households or not.



Cluster 1



Cluster 2

Figure 3 Location of selected households

3.7. Selection, Training and Supervision of Enumerators

A total of 5 enumerators were used throughout the various phases of the study. The selected enumerators resided in the local survey areas, spoke the local languages, understood the local sociocultural context, and were trained in research methods. Prior to the study, the enumerators were given necessary training/orientation mainly regarding the purpose of the study and the phases of the study, traits required for conducting effective survey, importance of receiving consent, recording energy measurement & cooking processes data, and use of KoboToolBox for data collection. The enumerators were constantly supervised during the survey.



Figure 4 Enumerator orientation and training

3.8. Methodology of Data Processing and Analysis

Data processing and analysis was done by the Project Team. The enumerators collected the qualitative and quantitative data through the questionnaire survey and cooking diary. The collected data were sent using KoBoToolbox app installed in their smart phone. The collected data were downloaded in excel sheet from which the team was able to create charts and graphs and subsequently analyze the data.

3.9. Limitations and challenges of the Methodology

- Covid pandemic delayed many activities at the field level and as a result we were only able to take data of 2 weeks during endline phase.
- We were only able to record data on LPG consumption on a meal level and dish level consumption has been estimated on a proportion basis.
- Use of hanging scale for measuring LPG gas of weight 30kg after each meal was difficult because it took longer time to balance the LPG cylinder and take the reading.
- There were lots of error while entering data from cooking diary to KoBoToolbox app which took a lot of time to clean the data.

4. Main research findings and lessons learned

4.1. Monitoring Community Cooking Practices

Evaluation of data at various phases

The cooking diaries study was split into four phases (Baseline, transition, monitoring and endline) and the data collection was done separately for all the four. The evaluation of data aimed to investigate and compare the situations between the baseline, transition and endline phase (i.e., before and after households received EPC). During these phases, most of the records correspond to a whole day of cooking. The period of study phases being different (3 weeks for baseline, 4 weeks for transition, 12 weeks for monitoring, and 2 weeks for endline), the number of data records for the different phases vary (Table 2), so the study has adopted percentage-wise comparison means for phase 1, phase 2 and phase 4 wherever possible and relevant. The details of the monitoring phase are discussed separately since only the dishes cooked in EPC were recorded during the monitoring phase and does not provide consistent comparison to other phases.

Table 2 Number of records in baseline, transition, monitoring, and endline phases

Phase	Number of records	Percent
Phase 1: Baseline	3297	15%
Phase 2: Transition	4200	19%
Phase 3: Monitoring	12600	57%
Phase 4: Endline	2100	9%
Total	22197	100%

The details of number of records per meal for the three phases (baseline, transition and endline) are shown in Table 3. The households were found to have cooked three meals per day (including heating water, boiling milk, and making tea). The introduction of EPC (Phase 2) hasn't really impacted this habit of cooking 3 meals daily. The average number of dishes cooked per meal has slightly decreased from phase 1 to phase 2 and 4 as indicated in Table 4.

Table 3 Number of heating events (single heating event records only)

	Baseline	Transition	Endline	Total
Morning Meal	1075	1369	647	3091
Afternoon Meal	399	450	96	945
Evening Meal	1008	1309	615	2932
Heating water	325	130	49	504
Total	2807	3258	1407	7472

Table 4 Number of dishes cooked per meal

	Morning meal			Afternoon meal			Evening meal		
	Baseline	Transition	Endline	Baseline	Transition	Endline	Baseline	Transition	Endline
N	1075	1369	647	398	450	96	1008	1309	615
Mean	3.28	2.79	2.80	1.72	1.78	1.55	2.38	2.27	2.24
Median	3.00	3.00	3.00	2.00	2.00	1.50	2.00	2.00	2.00
Std. Dev	1.00	0.66	0.71	0.75	0.63	0.60	0.75	0.58	0.50

Figure 5 gives a comparative data of number of dishes that is being cooked per meal. Most of the meals consist of 2 or 3 dishes and very few meals consist of single dish.

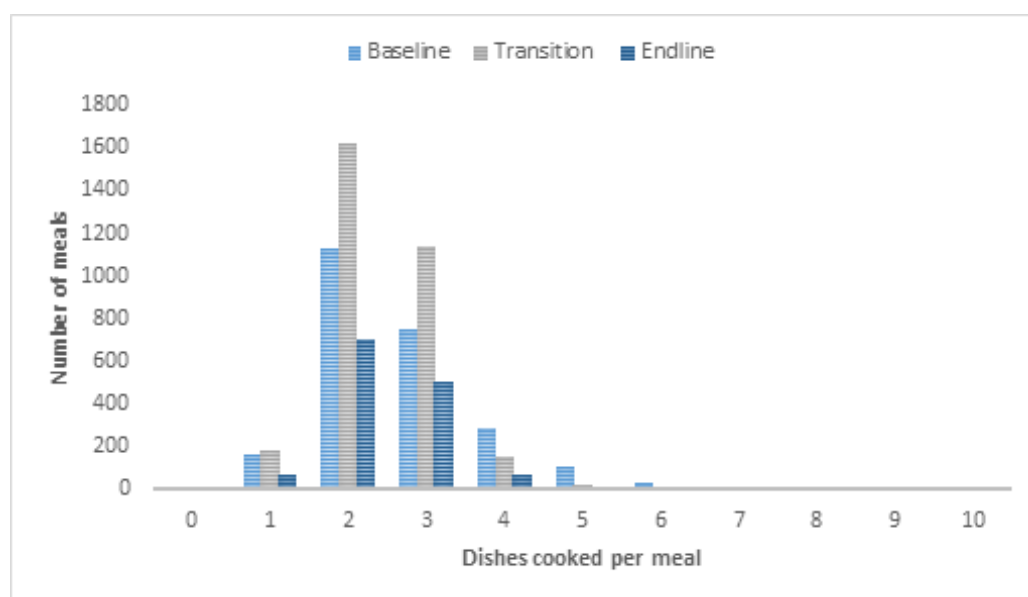


Figure 5 Number of meals vs dishes cooked per meal

Table 5 shows the dishes cooked for adult and children. The number of people per meal is on average slightly higher in Phase 3 followed by phase 2 and Phase 1. The data has not been normalized, so the changes between phases may not be significant.

Among the 50 households, 20 belonged to the disadvantaged group. Table 4 further shows that the number of people per meal is more for disadvantaged household for all age groups and during all the phases of study.

Table 5 Number of people per meal

Parameters		Baseline			Transition			Endline		
		All	DAG HHs	General HHs	All	DAG HHs	General HHs	All	DAG HHs	General HHs
Adults	N	2468	978	1490	3128	1288	1840	1355	582	773
	Mean	4.98	5.23	4.82	5.10	5.66	4.72	5.28	5.90	4.81
	Median	5.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	5.00
	Std. Dev	1.92	1.94	1.89	2.13	2.12	2.05	2.00	2.32	1.56
Children	N	2126	856	1270	2818	1208	1610	1226	543	683
	Mean	3.70	4.02	3.49	3.66	3.95	3.43	3.72	3.88	3.60
	Median	4.00	4.00	4.00	4.00	4.00	4.00	3.00	3.00	4.00
	Std. Dev	1.82	2.24	1.43	1.61	1.92	1.28	1.83	2.09	1.59
All People	N	2482	992	1490	3128	1288	1840	1358	582	776
	Mean	8.12	8.62	7.79	8.40	9.36	7.72	8.63	9.52	7.96
	Median	8.00	8.00	8.00	8.00	9.00	8.00	8.00	9.00	8.00
	Std. Dev	3.37	3.97	2.86	3.31	3.58	2.92	3.51	3.94	2.99

Change in cooking utensils

Karai (wok) was found to be the most frequently used utensil during all the phases, which slightly decreased after the introduction of EPC. The use of a traditional pressure cooker with LPG and firewood on the other hand had decreased during the transition phase and was still used less during the endline phase. This was because of the increased use of EPC, which was suitable for cooking the basic food items in a meal like rice, lentil soup and curry.

Most Popular Dishes in the households

Rice was found to be the most popular dish in the area followed by lentil soup and vegetable curry in the morning and evening meal. Roti (chapati) and vegetable curry are often prepared in afternoon meal. Similarly, rice, roti and vegetable curry are usually cooked for evening meal. Potato fry, potato curry and green leafy vegetables are other popular side dishes. Meat is cooked occasionally. The Table 6 below shows the most popular dishes recorded in the households in different phases.

Table 6 Most popular dishes in the area

	Food items	Baseline	Transition	Monitoring**	Endline	Total
Morning meal	Rice	1053	1313	2502	657	5525
	Vegetable curry	621	1054	317	480	2472
	Lentil Soup	790	827	759	415	2791
	Roti	94	109	0	27	230
	Potato fry	140	146	5	75	366
	Meat	33	46	4	9	92
	Potato curry	92	9	0	2	103
	Green leafy vegetables	100	122	17	70	309
	Fish curry	16	13	0	3	32
	Jaulo	14	1	3	0	18
	Tomato pickle	57	2	0	0	59
	Fritters	50	28	1	32	111
	Bottle gourd curry	43	0	0	1	44
	Egg curry	22	2	1	0	25

Afternoon meal	Rice	38	40	19	21	118
	Vegetable curry	140	223	3	47	413
	Lentil Soup	14	29	3	4	50
	Roti	221	277	0	42	540
	Potato fry	58	84	0	23	165
	Meat	14	16	1	9	40
	Potato curry	9	0	0	0	9
	Green leafy vegetables	2	10	0	2	14
	Fish curry	6	7	0	0	13
	Jaulo	69	55	4	0	128
	Tomato pickle	0	0	0	0	0
	Fritters	2	3	0	0	5
	Bottle gourd curry	1	0	0	0	1
	Egg curry	5	0	0	0	5
Evening meal	Rice	666	673	1011	330	2680
	Vegetable curry	493	918	459	456	2326
	Lentil Soup	108	195	142	74	519
	Roti	444	711	0	325	1480
	Potato fry	35	78	2	17	132
	Meat	185	154	68	77	484
	Potato curry	58	2	0	0	60
	Green leafy vegetables	39	67	9	35	150
	Fish curry	81	75	0	19	175
	Jaulo*	8	9	5	1	23
	Tomato pickle	25	4	0	1	30
	Fritters	10	8	1	13	32
	Bottle gourd curry	17	0	0	0	17
	Egg curry	25	5	0	1	31

* Jaulo is a type of dish where rice is cooked with salt and lots of water

** The data from monitoring phase consists of records only cooked in EPC.

Energy Uses and Consumption

The respondents were asked to weigh their firewood, cow dung and LPG cylinder before and after cooking a meal to know their fuel consumption. Since not many households had used cow dung to prepare a whole meal, cow dung has not been used in the comparison. Similarly, agriculture residue was used in combination with chopped firewood and twigs, we have considered them as firewood. The electricity consumption used for each cooking event was also measured by an electric meter (known as submeter). In order to compare the energy consumption per energy source, the conversion factors in Table 7 were used:

Table 7 Energy units conversion rate

Fuel	Calorific value
Firewood	15.9 MJ/kg
LPG	46 MJ/kg
Electricity	3.6 MJ/kWh

Table 8 shows the choice of fuel types at dish level in different phases of the study irrespective of fuel stacking. The table shows that Firewood was the major choice of fuel followed by LPG for both the DAG and general HHs. The difference between Firewood and LPG use was less

than 10 % during baseline phase for general households. A remarkable difference was observed between LPG and Firewood use during Transition phase after the introduction of EPC. The decrease in Firewood use was seen less in comparison to reduction in LPG use. From less than 1% use of electrical cooking in general HHs (using rice cooker) during baseline, it surged up to around 25% in DAG HHs and 20% in General HHs during Transition phase. The surge in electric cooking dropped however in the Endline phase and remained around 15% in DAG HHs and 17% in General HHs. Despite the decline in electric cooking during the endline phase, the data indicates that the use of EPC has sustained in the area, especially for general HHs. Biogas was available in only one household. There were two reasons for the decrease in electric cooking. One reason was that some of the households had reported faults in the EPCs (defects in fuse, damaged power cord etc.) and since there were not any service Centre available locally, the EPCs had to be brought to Kathmandu for repairing and that had taken few weeks. Another reason was because the endline phase was conducted during festival season and due to large amount of food to be cooked during festivals, the households adopted traditional biomass stoves since it was not possible to cook food for more people in EPC.

Table 8 Use of fuel at dish level by percentage of heating events across phases in DAG and general HHs

Types of Fuel	Baseline		Transition		Endline	
	DAG HH	General HH	DAG HH	General HH	DAG HH	General HH
Firewood	67.09%	53.72%	54.76%	52.66%	62.22%	44.62%
LPG	32.90%	45.5%	20.19%	25.83%	22.63%	37.81%
Biogas	0.00%	0.07%	0.00%	1.60%	0.00%	0.10%
Electricity	0.00%	0.66%	25.03%	19.89%	15.13%	17.45%

Table 9 and

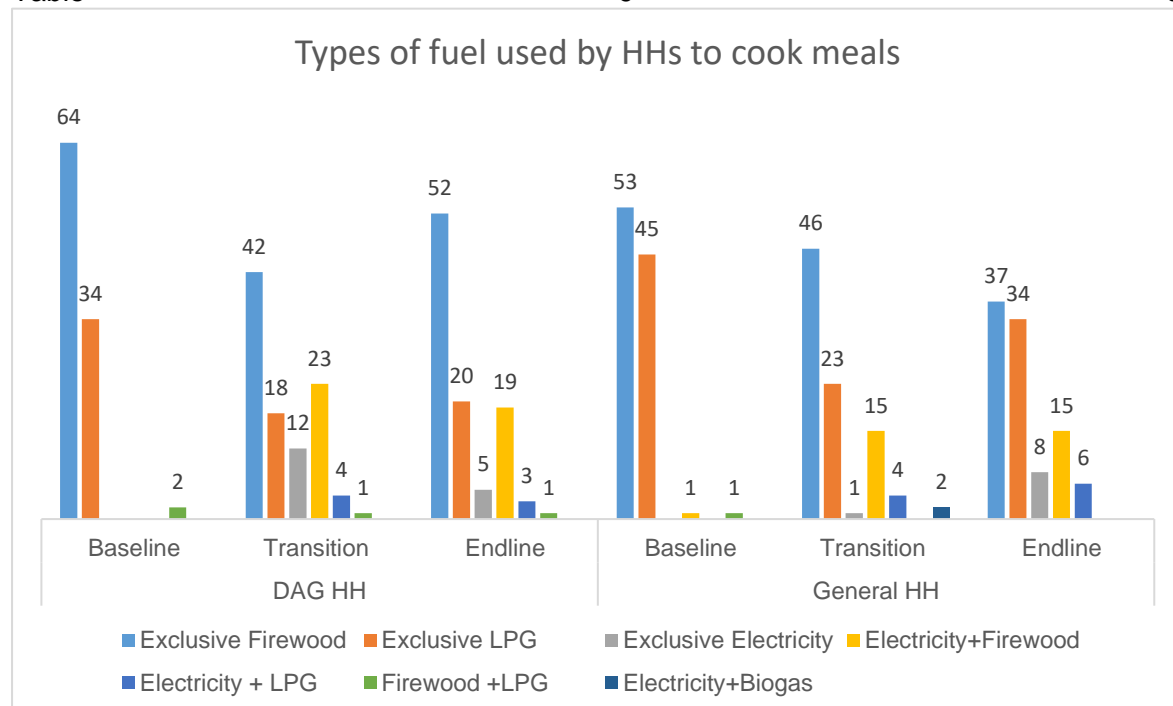


Figure 6 shows the choice of fuels used in combination by DAG and General households at meal level. During baseline phase the households were found using either of Firewood or LPG

to cook all the dishes in a meal. Fuel mix (LPG and firewood, rice cooker and firewood) was rarely seen during baseline phase. After the introduction of EPC in transition phase, the share of both the biomass and LPG stoves have reduced whereas the percentage of fuel mix have increased. EPC in combination of firewood was seen on more occasions than with any other fuel combination. It indicates that EPC might be more suitable to replace LPG rather than biomass, which is most of the times available for free of cost.

Table 9 Fuel stacking combinations for meals across phases in DAG and General HHs (% of meals)

Major fuel types	DAG HH			General HH		
	Baseline	Transition	Endline	Baseline	Transition	Endline
Exclusive Firewood	64%	42%	52%	53%	46%	37%
Exclusive LPG	34%	18%	20%	45%	23%	34%
Exclusive Electricity	0%	12%	5%	0%	10%	8%
Electricity+Firewood	0%	23%	19%	1%	15%	15%
Electricity + LPG	0%	4%	3%	0%	4%	6%
Firewood +LPG	2%	1%	1%	1%	0%	0%
Electricity+Biogas	0%	0%	0%	0%	2%	0%
	100%	100%	100%	100%	100%	100%

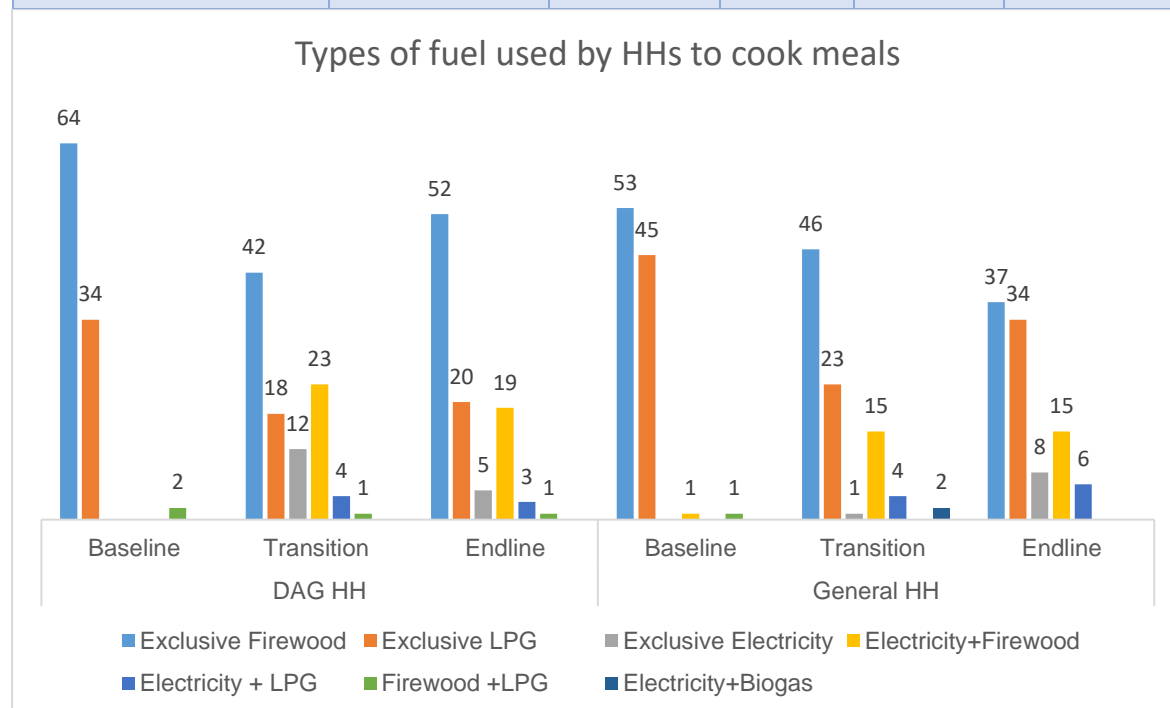


Figure 6 Types of fuel used (exclusive and mixed) by Households in different phases (% of heating events)

EPC was mostly found to be used for cooking rice followed by vegetable curry and lentil soup (Table 10). More than 95% of all foods cooked in the EPC were either of the three dishes, with Rice accounting for more than 50%. It indicates that the households prefer cooking the types of dishes in the EPC that requires less or no frying and can be left unsupervised after setting a timer. Vegetable curry and lentil soup occasionally are substitute for each other especially when the meal only consists of 2 dishes. Figure 5 has shown that most of the households prepare 2 dishes in a meal. Another reason for rice being popular in EPC could also be the design of the EPC which looks similar to traditional rice cooker and people might have perceived as more suitable to cooking rice.

Table 10 Percentage of Food items cooked in EPC

Food Items	Transition	Monitoring	Endline
Rice	54%	66%	52%
Vegetable curry	19%	15%	19%
Lentil Soup	22%	17%	27%
Others	5%	2%	2%

Energy consumption, Time taken to cook, and cost incurred per meal

Table 11 shows the average per capita energy consumption, average time taken per meal and cost of per capita energy consumption for each of the morning, afternoon, and evening meals. The conversion rate of different fuels to energy (MJ) has been given in Table 7. Biomass was found to be the most inefficient fuel in terms of per capita energy consumption whereas EPC was found to be the more efficient than LPG. Similarly, all 3 meals were cooked faster in EPC whereas LPG and Biomass showed similar duration of cooking. EPC was also found to be the cheapest source of fuel compared to LPG. The calculation below is based on the current price of fuels, LPG -NPR 1575 per 14.2 kg cylinder, Electricity- NPR 10 per kWh (consumers up to 250 units bracket) and Firewood- Rs 10 per Kg when purchased. Although biomass has appeared to be most expensive while purchasing, it should be noted that most period of the year the local households do not have to buy firewood and they are usually collected from their backyard.

Table 11 Meal wise energy consumption, time taken, and cost incurred

Meal	Average Per Capita Energy Consumption per meal (MJ)			Average Time taken to cook a meal (minutes)			Cost per capita energy consumption (NPR)		
	LPG	Biomass	EPC	LPG	Biomass	EPC	LPG	Biomass	EPC
Morning	0.60	12.07	0.50	88.00	86.00	64.00	1.44	7.59	1.38
Afternoon	0.31	7.25	0.21	52.00	56.00	28.00	0.75	4.56	0.58
Evening	0.31	7.25	0.21	65.00	69.00	40.00	0.75	4.56	0.58

The calculations in the Table 11 were calculated from data taken from households using one fuel exclusively to cook a meal. Therefore, the comparison here may not be conclusive as the dishes cooked in different stoves might be different. Hence, further calculations were made for some of the popular dishes in the area. Although, roti (Chapati) is one of the main foods in the area, we have not included it in the comparison as EPC is not suitable for preparing roti.

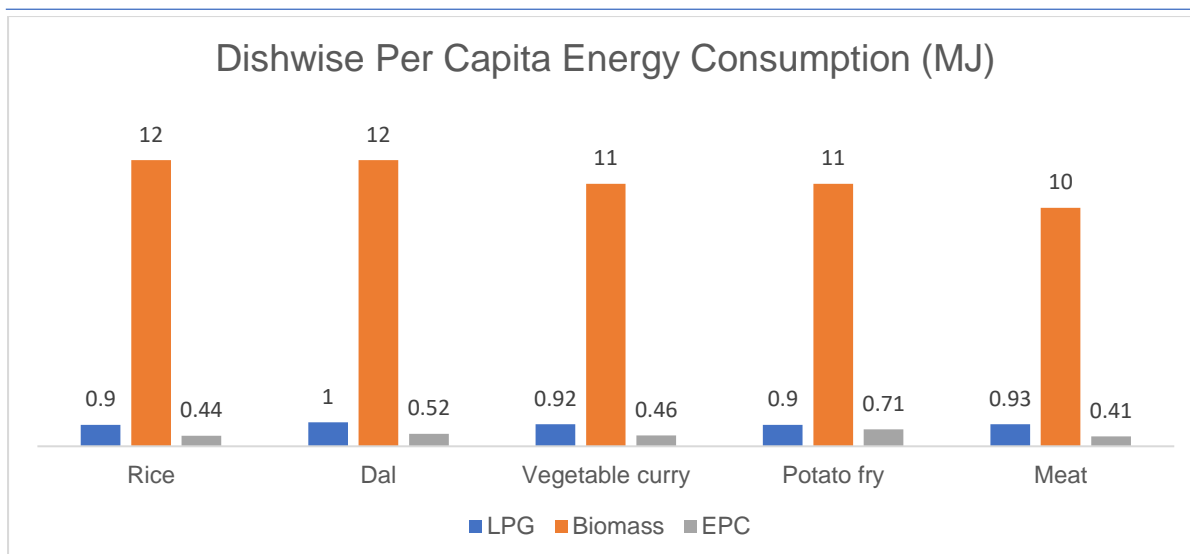


Figure 7 Dish wise per capita energy consumption

Similar trend was observed at dish level too. Figure 7 shows the per capita energy consumption for the most popular dishes in the area. The type of foods which are usually cooked with lids closed were found to have consumed less energy when cooked in EPC compared to LPG and biomass. Foods cooked in EPC were found to consume almost 50% less energy compared to LPG. For dish that needs frying, the difference between LPG and EPC has been less.

Similarly, Figure 8 shows that the dishes cooked relatively faster in EPC except for lentil soup whereas it was almost similar in case of meat. The larger difference was seen in rice which took almost 33% lesser time in comparison to LPG. Both the lentil soup and rice are cooked in traditional pressure cookers when cooked in firewood and LPG whereas meat is cooked both in open pots (with lid used intermittently) and traditional pressure cooker.

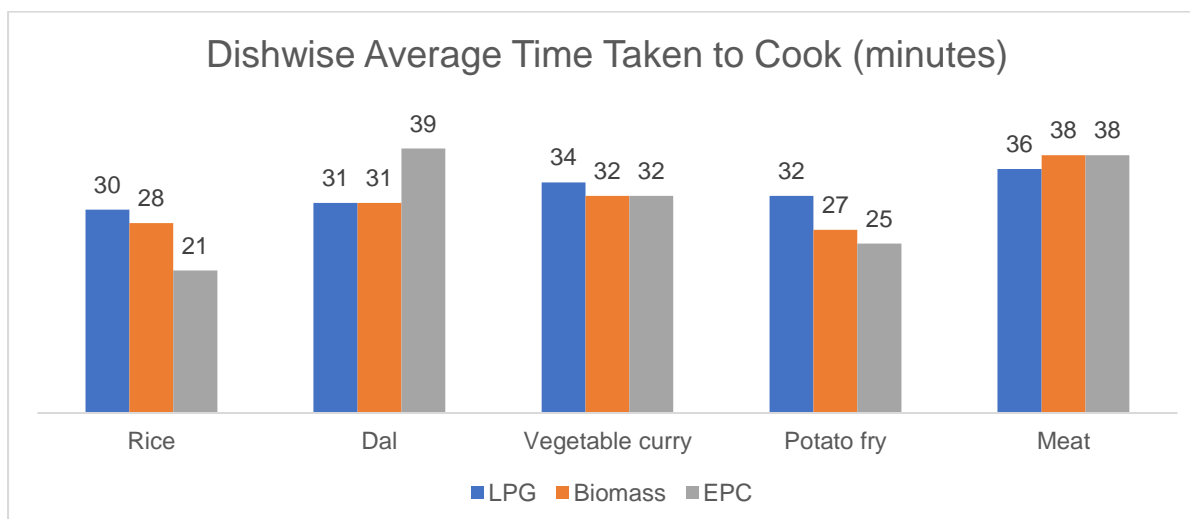


Figure 8 Dish wise time consumption

Likewise, Figure 9 shows that the cost per capita energy consumption was also found lowest for dishes cooked in EPC in comparison to other fuels. Overall, cooking in EPC cost almost half to those cooked in LPG and at least five times lesser than Firewood for the dishes that does not require deep frying.

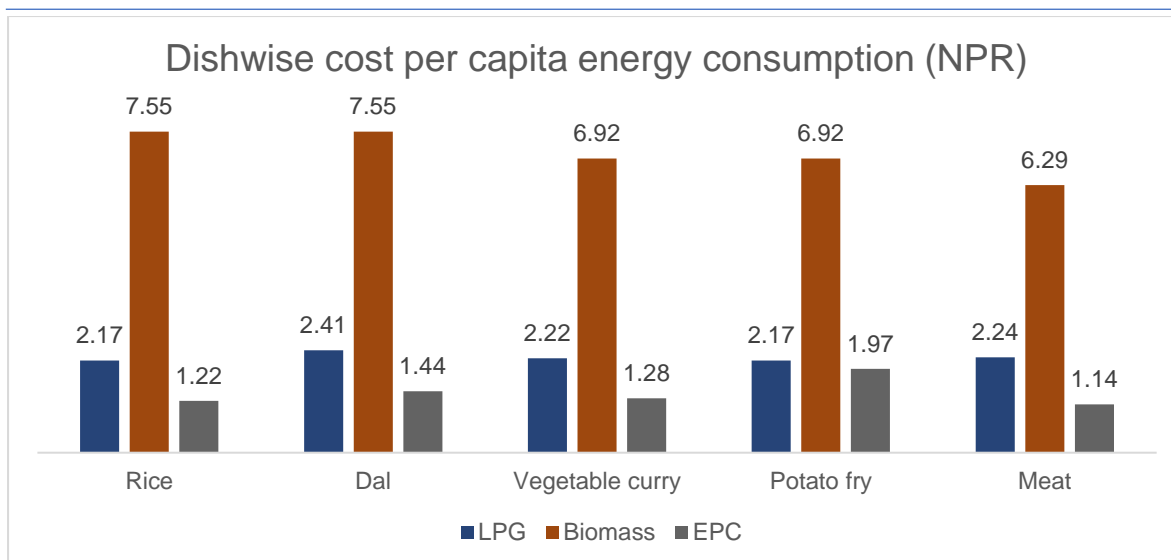


Figure 9 Dish wise cost comparison

Disaggregated by meal, Figure 9 shows cooking in EPC was almost 1.8 times cheaper to LPG and 6.2 times cheaper to Firewood for Rice, 1.7 times cheaper to LPG and 5.2 times cheaper to Firewood for Dal (lentil soup), 1.7 times cheaper to LPG and 5.4 times cheaper for vegetable curry, 1.1 times cheaper to LPG and 3.5 times cheaper to Firewood for Potato Fry, and 1.9 times cheaper to LPG and 5.5 times cheaper to Firewood for Meat. In case of dishes that need frying, the difference between LPG and EPC was not significant.

4.2. Voltage distribution in the area and impact in existing electrical infrastructure

Measurement of voltage at household level was carried twice a day by using multimeter. The measurements were taken once in the morning between 6 AM to 10 AM and once in the evening between 6 PM and 10 PM. The table below shows that the mean voltage in the area is lower than 220. Average Voltage in the morning time is little higher than in the evening. According to the specification, the EPC we chose runs within the range of 185 to 250. The households did not report in any instance that the low voltage had deprived them from using the EPC. Prior to installing EPCs in the households, the project had upgraded the house wiring of the 50 households. All the households had 5 Ampere connection and it was found enough for running EPC. No impact on existing electricity infrastructure was observed with the adoption of EPC. Therefore, the study has not suggested any strengthening measures. However, it is advised that the households may need to upgrade the existing 5 Ampere connection to 15 Ampere so that they will be able to run multiple electrical appliances simultaneously, if necessary. Table 12 shows the voltage distribution in the area.

Table 12 Voltage distribution in the pilot area

Phases	Morning					Evening				
	Range	Mean	S.D.	95% CI	V>185	Range	Mean	S.D.	95% CI	V>185
Baseline (April 4-25)	226-113	196	15	166-226	85%	250-110	195	15	165-225	80%
Transition (June 28-July 25)	235-155	202	15	172-232	87%	232-155	199	16	167-232	79%

Monitoring (August 3- October 25)	230-100	200	13	174- 226	89%	228-101	198	15	168- 228	81%
Endline (November 1- 14)	228-170	201	11	179- 223	91%	227-161	200	13	174- 226	87%

4.3. Exit Survey- Qualitative Information

An exit survey was carried out from 15-16 November 2021 by the Winrock Project team. The questionnaire provided by MECS was slightly modified by the team to suit local conditions and was also translated into the Nepali language. The exit survey questionnaire is sent as separate attachment.

The exit survey was conducted in 49 Households (out of total 50) because 1 household had stopped using EPC after experiencing electric shock in it. This exit survey mostly provides qualitative feedback from participants on their perceptions and preferences of the EPC they have been using. 49 participants took part in this exit survey and provided their feedbacks and shared their experiences with the survey team.

Below are some of the feedbacks and responses collected during exit survey:

In most households (44 of 49), only the female member(s) of the family used the EPC. At 5 of the 49 households male and female members of the family used the EPCs but male members tended to use the EPC only occasionally (Figure 10).

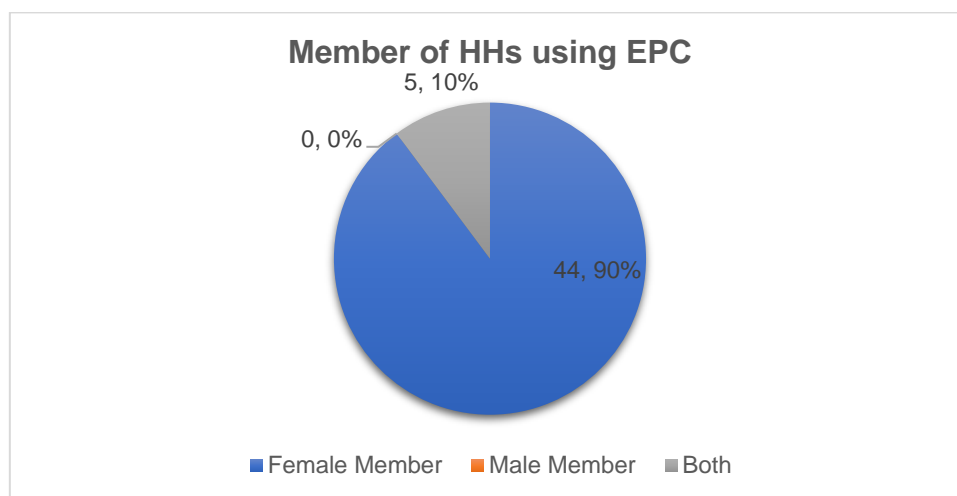


Figure 10 Member of HHs using EPC

Relatedly, most of the participants (34 out of 49) have expressed that change in cooking responsibilities, which always has been women's responsibility, was not seen to have changed (Figure 11). A few participants said that their husbands and daughters had also started to cook with EPC, because they felt that cooking with EPC was easier compared to previous cooking process.



Figure 11 Change in responsibility of cooking

Majority of the participants found EPC easier to cook and said food tasted better when cooked in EPC, especially meat and vegetables. 9 out of 49 participants said that EPC cooks faster while 8 participants considered EPC hasn't changed anything to the way they cook their meals.

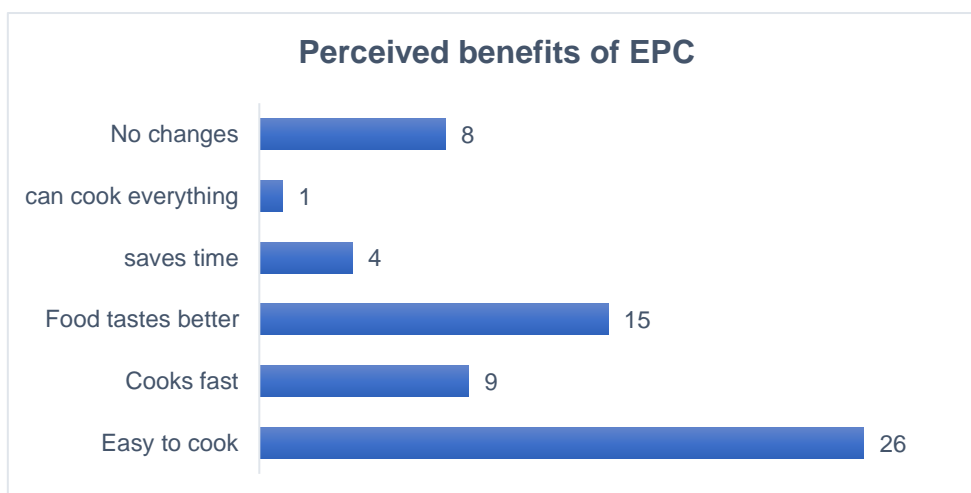


Figure 12 Perceived benefits of EPC

9 out of 49 participants said that they learned to cook using electricity as a result of the orientation and demonstration provided to the users. However, most of the participants have reported that they have not discovered any new techniques in the way of cooking after using EPC (Figure 13).

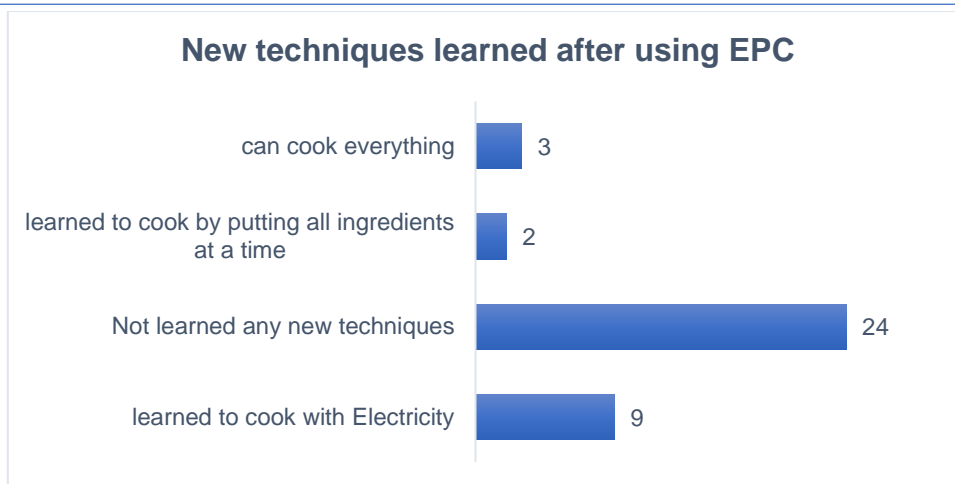


Figure 13 New techniques learned after using EPC

As responded by the majority of the participants, COVID-19 has not substantially affected cooking. However, 21 out of 49 participants reported that price of the daily commodities like food, groceries etc. (Figure 14). was increased during lockdown and also some of them said that it was difficult to get the daily commodities at said time.

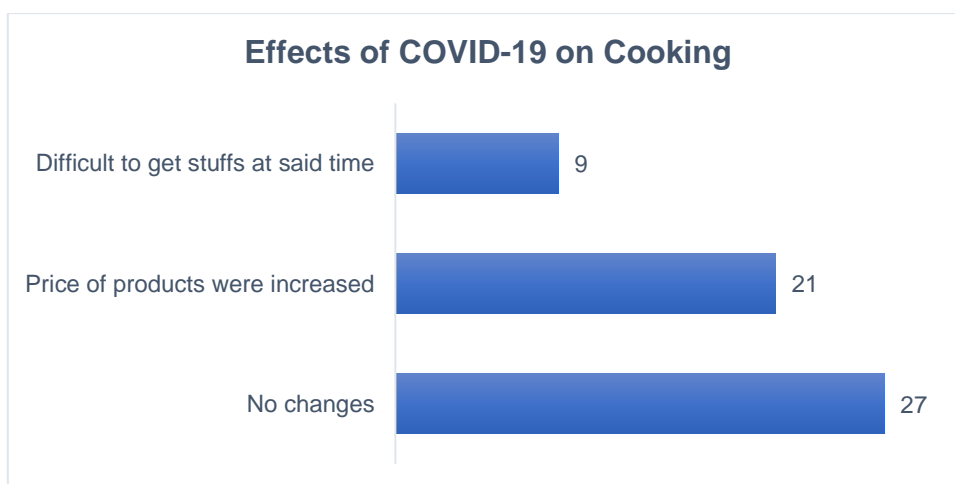


Figure 14 Effects of COVID-19 on Cooking

Almost all the participants reported that they easily learned to use EPC for cooking after orientation. While 4 out of 49 found it a little difficult to use EPC in the beginning, they learned to use it after 2-3 days.

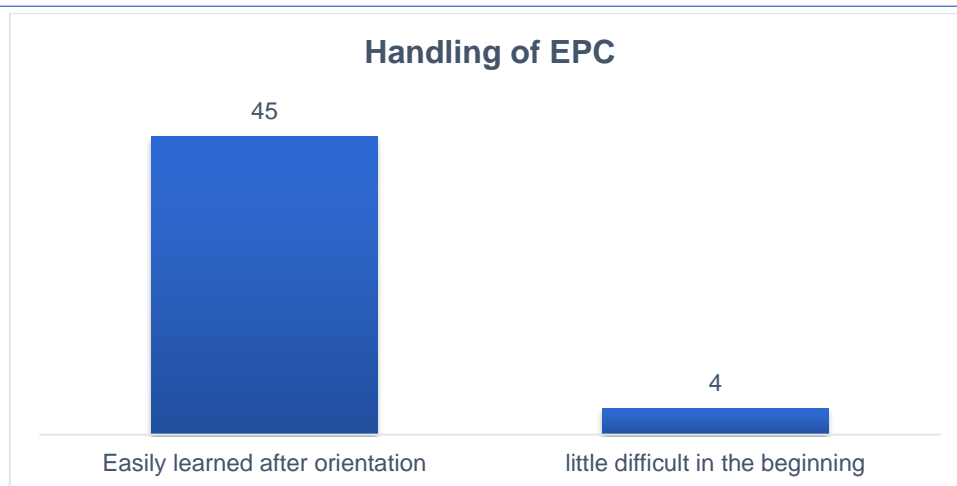


Figure 15 Handling of EPC

Except for its perceived small size, the EPC does not cause substantial dissatisfaction among participants. The EPC provided is ideal for cooking food for 6-8 people, but for larger families with more than 10 members, the provided size will not be enough to cook rice for everyone, and users will have to cook rice twice. As a result, 25 out of 49 participants have expressed the need for a larger EPC as well as an extra inner pot so that they can cook multiple food items without having to empty it after each meal.

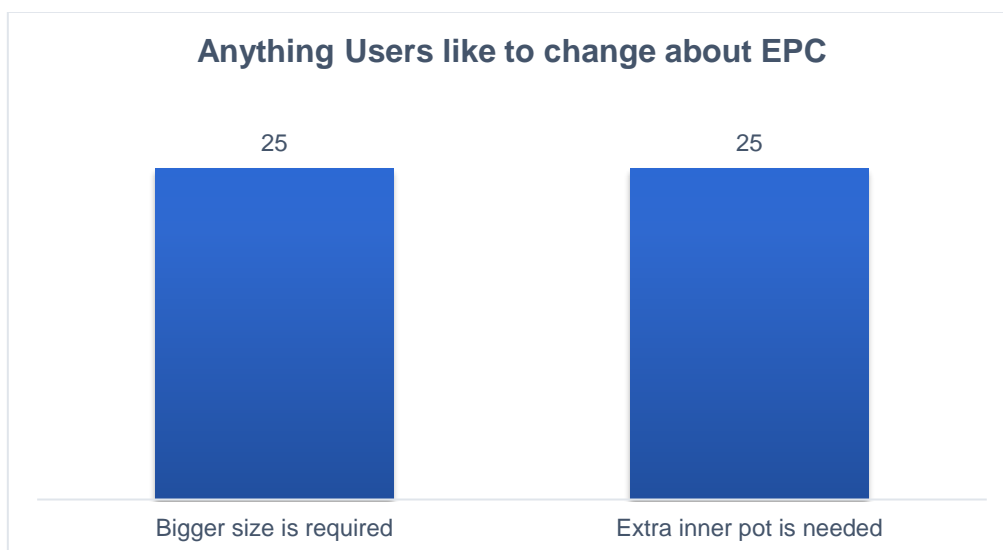


Figure 16 Changes to EPC

The main reasons why participants like to cook with EPC is because it saves time and is very easy to handle. Some also mentioned that food tastes better when cooked in EPC and that it is cheaper than LPG. Few participants also mentioned that they could do other chores while cooking. Participants reported that they used their saved cooking time doing other works such as looking after child, working in farm, cleaning house, washing clothes, studying, going out to purchase things, bathing etc.

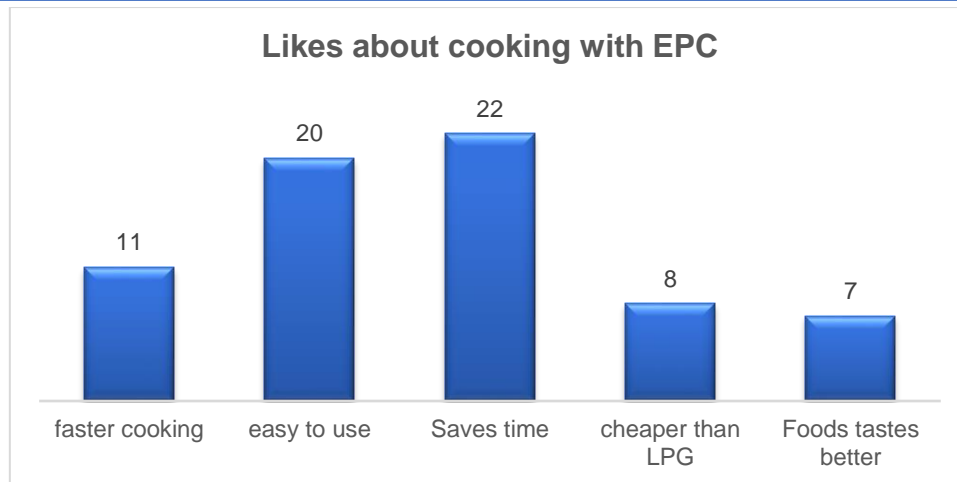


Figure 17 likes about cooking with EPC

The primary reason for using firewood for cooking is that it is easy to cook for large number of people, for example during festival and when they have to feed hired helpers during rice plantation season. As EPC given is small in size and can accommodate cooking for 6- 8 people only, when family member increases firewood is used for cooking. In some households, firewood is also used to prepare animal feed. Some participants said that they only use firewood in the winter because it may also be used for heating purpose. Another reason for using firewood is to cook meat and other non-veg food items such as chicken, mutton, fish, egg, and so on, because some participants stated that if they cook non-veg dishes in the EPC, it cannot be used to cook food during sacred festivals, and some family members are vegetarians who prefer not to eat food cooked in the same EPC in which non-veg items are cooked.

46 out of 49 participants continue to use LPG for cooking, especially during power outage and when in hurry as EPC cannot cook all the food items at a time so some items are cooked with LPG also. LPG is used to boil milk, to cook chapati, also in some houses it is used to cook rice when family members increase.

Almost all the participants agreed that cooking with EPC is cheaper and more affordable than LPG and firewood (if firewood is purchased). It is found that most households have a free supply of firewood from their own farm. Therefore, EPC is not cheaper than firewood in such circumstance.

Smoke can cause headaches and can cause eyes to become red and watery. It also results in a dirty house and dirty pots. They don't see the benefit of smoke, except for one person who claimed it keeps mosquitoes away.

Everyone agreed that EPC is safer to use than LPG or firewood, and that if a short circuit occurs, the MCB will automatically trip, preventing a fire. There is no danger of an explosion or a fire, as there is with LPG. Similarly, when compared to LPG and firewood, there is no direct fire in EPC, which reduces the risk of fire/burn accidents. However, two participants stated that there is a risk of electric shock while not wearing shoes in the kitchen, a common household practice in Nepal.

People were generally happy with food cooked in EPC. However, some people also complained of rice getting sticky and burned at the bottom of the pot along with lentils soup not being tasty when cooked with EPC.

About 84% of the DAG households and 93% of general households reported that they are willing to purchase another EPC in the future. It shows that the consumer's preference to the EPC is very high despite its limitations.

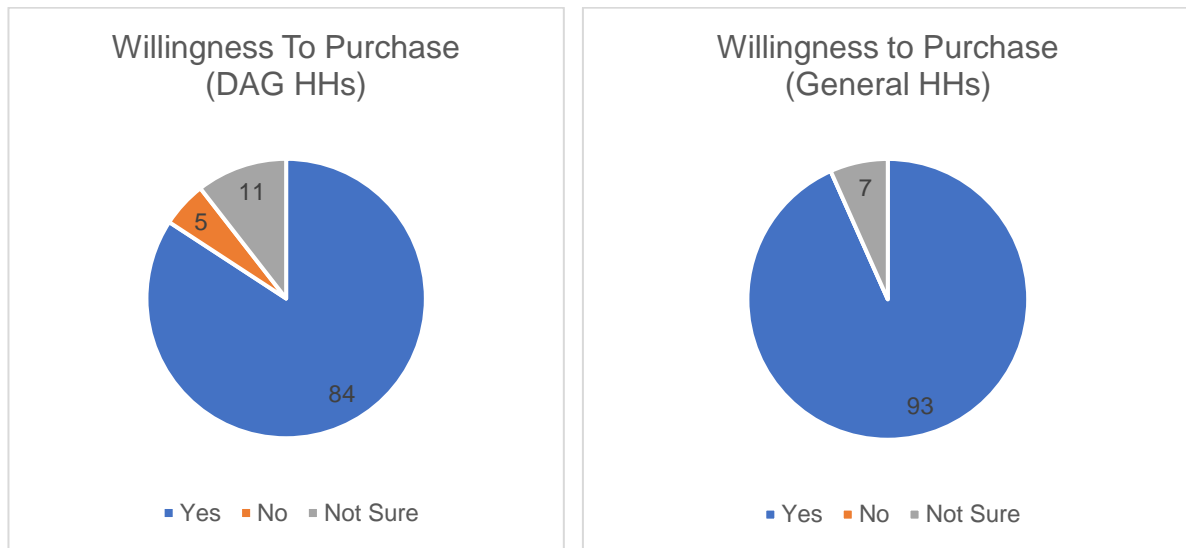


Figure 18 Willingness to purchase

The majority of participants were interested in purchasing an EPC and were willing to pay between NPR 1000 and 10,000 for it (Table 13). If a larger size is available, they would even be willing to pay extra. After knowing the actual price of EPC, the majority of participants are still willing to purchase them. This is most likely because they have been comfortable cooking with it and do not wish to return to their old condition. All of the participants would advise others to buy and use these types of appliances, and nearly all of them had already done so, especially when someone came to inquire about the EPC.

Table 13 shows that almost 60% of the households (75% of DAG households) are willing to pay above NPR 5000 for the EPC which is near the cost of a new EPC (brand with lowest price) in Nepalese market. This indicates that they value the EPC and want to continue using it. However, it is difficult to say if they would actually pay that amount in a real scenario.

Table 13 Price households are willing to pay for an EPC

Price (NRs.)	DAG	General
1000-2000	2	8
3000-4000	3	2
5000-6000	5	11
7000-8000	5	6
>8000	5	2

Power outages appear to be common, with nearly half of the participants reporting power outages at least once a day. This power outages last between 5 and 30 minutes and if there is poor weather, such as thunder, storms, or rain, or if a technical problem emerges, these power outages last for more than an hour or even for the entire day.

65% of the interviewees consider it affected their cooking during power outages. Out of these, 80% choose to cook using other fuel such as LPG and firewood during power outages.

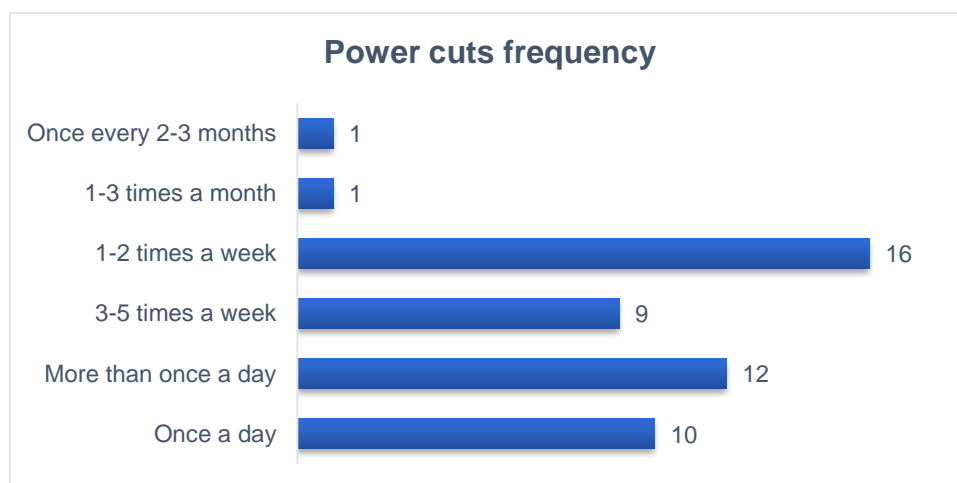


Figure 19 Power cuts frequency

Only 16 percent of the participants (8 out of 49) indicated they had problems with their electric cooking appliances, while the rest were satisfied. These problems were mainly electrical such as no power supply to EPC, indicators light not working, steam leakage problem and one related to house wiring. Some of the participants also mentioned that the non-stick coating of inner pot wore off after few months of use and as a result of it rice stick at the bottom and also get burned.

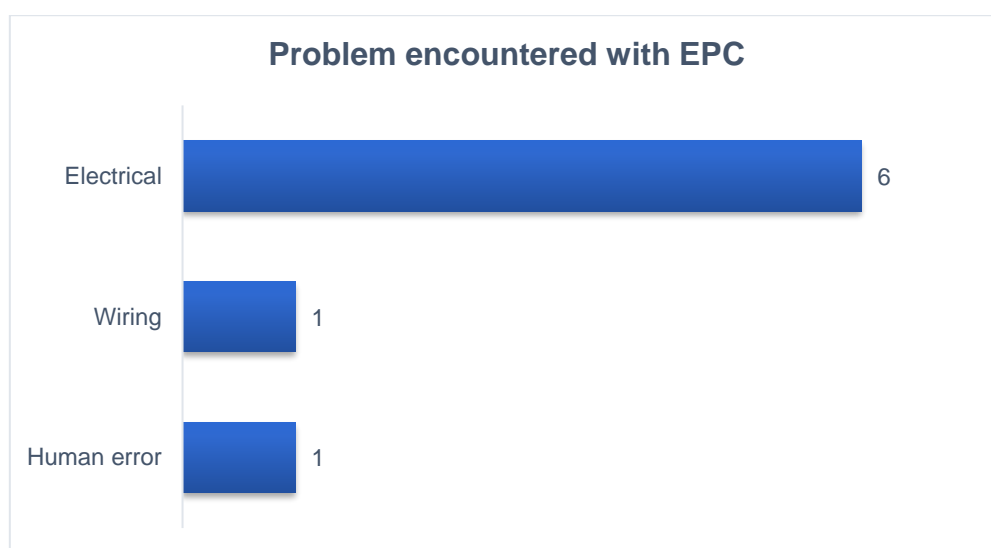


Figure 20 Problem encountered with EPC

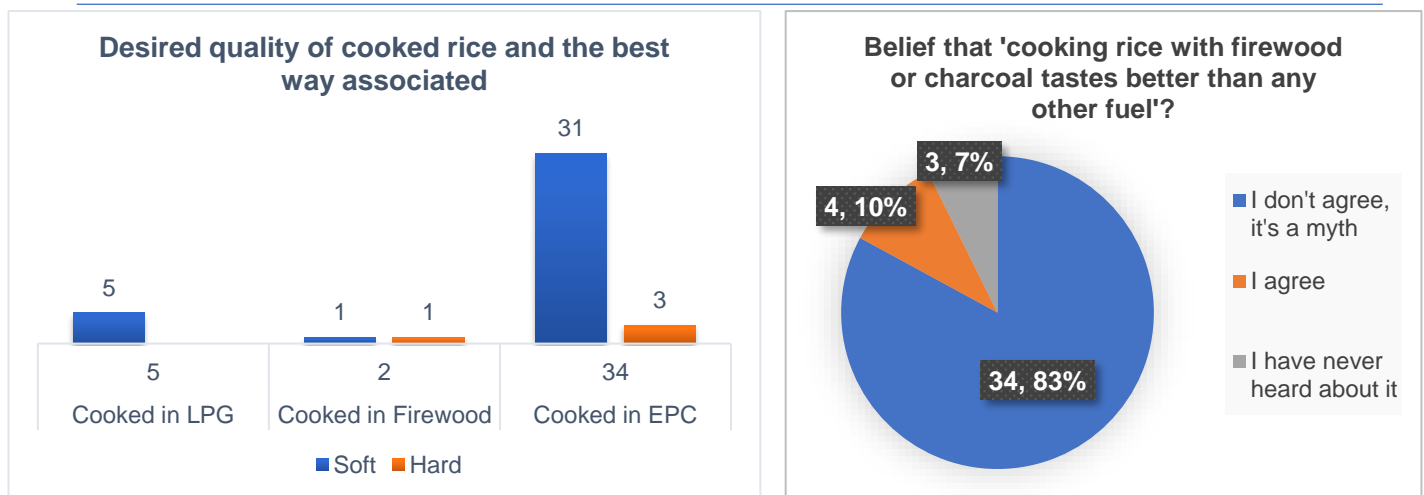


Figure 21 Perception on the quality of cooked rice

Participants mostly prefer the rice when it's cooked soft while few said hard and the best way to cook the desired quality of rice as agreed by majority of participants is when cooked in EPC. As a result of survey, majority of participants (34 out of 49) reported that they don't agree with the belief that cooking rice with firewood tastes better than with electricity. Whereas only 4 out of 49 insisted that cooking rice with firewood tastes better.

User's Feedback

During the exit survey, the research team also interacted with the household respondents to get their other feedback regarding the EPC. Most of the households said that an extra inner pot would increase the usability of the EPC and it will make it easier for the cook to prepare different dishes without having to transfer the food. This might also encourage the households to cook multiple dishes in the EPC. The households with larger family size felt larger EPC would be more suitable for them. EPC was found to be very easy by the students whereas it was found to be difficult to operate by the elderly.

4.4. Stakeholder interactions

No project is successful without synergy among the stakeholders. We interacted with local representatives of the pilot municipality. The mayor and ward Chairmen of the municipality agreed to support the project. The municipality also provided written commitment to provide financial subsidy to the intervention households to purchase the EPC. Selection of intervention household was done in consultation with the mayor and ward chairmen. Similarly, the chief of NEA's local electricity distribution centre committed to providing required support in terms of electricity supply and upgradation of Miniature Circuit Breakers (MCBs) in the intervention households. We also met with the Assistant District Forest Officer of the area to collect information on the price of firewood in the area. He shared that the forest charges NRs 3 per kg of wood collected. These are seasonal collection as the forest opens the collection few times a year. The households also purchase firewood occasionally at the price of NPR 1000 per 100 kg. Similarly, the local MFI was positive to provide credit options and loan products to the customers, if needed. Now, the pilot is almost at the end and for the upscale of the project in the area, there needs a strong financial support from the municipality because the area is heavily influenced by subsidy driven (or even full subsidy) programmes and despite the locals' knowledge on the benefits of efficient electric cookers, they will still look out for free ride and to change that behavior, local, provincial or federal governments might need to bring forward

other better incentive mechanisms such as reduced tariff rate for cooking or provide credit at subsidized interest rate etc. along with behavior change campaigns.

With only 50 households using EPCs, problem in distribution infrastructures were not observed. However, if all the households would want to use the EPCs, the local electricity office will have to play a key role in strengthening the distribution system in the area and should also support household meter upgradation.

Beyond the project period and in the absence of subsidies, local financial institutions will have to lend credits to the local households at minimum interest (as possible) for the purchase of EPCs for needy households.

There were no resistance or opposition from any stakeholders to the project as such. However, we had received some suggestions such as:

- One ward chairman had suggested that we provide EPCs in all of the households in his ward because if we distribute in few households only, then the rest would feel disparity and discrimination. His idea was to distribute the EPCs for free and he would lobby with the Municipality for the fund. In response, we informed him that it was only a pilot project and we wanted to test whether the local people will accept the product or not and whether the electric infrastructure will withstand the use of limited EPCs before making wider use of it.
- Many of the intervention households are asking for an extra inner pot so that they do not have to pour the food in another pot and can simply switch the pot for cooking next dish. We reached out to the vendor and asked for the price of inner pot. The information has been relayed to the consumers and soon they might purchase the extra pot on their own.
- The Mayor, after agreeing to provide financial contribution, expressed his dissatisfaction with the product saying he didn't like the taste of the food cooked in EPC. This came as a surprise and as a challenge. Later, when we met him, he said that he gradually liked the taste and did not have any complaints regarding taste.

4.5. Scaling up electric cooking

Educated, higher-income households in urban and peri-urban areas will constitute the early adopters of electric cooking. The increased availability of electric cooking appliances and the example set by early adopters will help electric cooking spread from early adopters to other households in urban, peri-urban, and rural municipalities that are already cooking with LPG.

The following barriers need to be addressed for the upscale of electric cooking in Nepal.

Shortage of electricity generation capacity—Until 2020, Nepal had a significant power deficit, resulting in continual load shedding and making electric cooking unreliable. Recently, Nepal has brought more electricity generation online, increasing reliability and leading to a projected surplus of electricity beginning in the fourth quarter of 2020, following the commissioning of the 456 megawatt (MW) run-of-river Tama Koshi Hydropower plant. In May 2018, the Ministry of Energy, Water Resources, and Irrigation (MoEWRI) published the white paper Present Status and Future Roadmap of Energy, Water Resources, and Irrigation Sector, which states: “To minimize the trade deficit by reducing the import of LPG, ‘Electric Cooking’ will be promoted and encouraged in each and every household.” The white paper announces an ambitious target of increasing per capita electricity consumption from the current, globally low level of 174 kilowatt hours (kWh) to 700 kWh by 2023 and 1,500 kWh by 2028, in part by increasing electric cooking.

Lack of consumer awareness of the cost advantage, speed, and versatility of electric cooking—In 2016, 53% of grid-connected urban households used imported LPG for cooking, while grid-connected rural households used firewood and other biomass fuels. The majority of consumers are not aware that induction cookers and electric pressure cookers cost the same as an LPG stove and cylinder, cook food faster, are suitable for cooking nearly all foods, and cost less than LPG to operate. While rice cookers are already popular in urban areas, rural consumers are not aware that rice cookers are affordable to purchase and operate and extremely easy to use for cooking rice.

Lack of consumer and business finance for electric cookers (ECs)—Some urban residents and most rural residents will need financing to pay for ECs, but current consumer finance options do not include electric cooking appliances.

Lack of electricity distribution infrastructure—Currently, many of the distribution networks on the electrical grid are overloaded, but the Nepal Electricity Authority (NEA) is upgrading transformers and increasing the size of electrical lines in certain areas, including parts of the Kathmandu Valley and Pokhara.

Lack of adequate home wiring—The lowest electrical grid connection of 5 amperes (amps) provides just enough power for a rice cooker, but high-efficiency ECs require at least a 15-amp connection. Households also need adequately sized, grounded interior wiring and plugs.

Key stakeholders for facilitating the scale up of electric cooking in Nepal.

Ministry of Energy, Water Resources, and Irrigation (MoEWRI) develops policies that facilitates electric cooking. The Alternative Energy Promotion Centre (AEPIC) is the responsible government organization under MoEWRI for alternative energy promotion. Similarly, Nepal Electricity Authority (NEA) under MoEWRI is responsible for the generation, transmission, and distribution of electricity throughout the country. Electricity Regulatory Commission (ERC) is mandated to regulate the generation, transmission, distribution, and trade of electricity by making the process simple, regular, systematic, and transparent. Determination and regulation of consumer tariff is one of the main functions of the ERC. Ministry of Finance (MoF) is responsible for regulating taxes and import duties in electric cooking appliances. The provincial ministry, Ministry of Physical Infrastructure, and Development (MoPID) is responsible for all the physical development works that are carried out in province level.

The private companies like Chaudhary Group, Baltra, etc. are capable of supplying large number of electric cooking appliances and potentially establish domestic assembly plants.

Banks and other Financial Institutions can provide wholesale and retail loans to large distributors/assemblers and local distributors respectively. Micro-finance institutions and co-operatives can provide credit facility to consumers to facilitate upfront cost to their members.

NGOs and CBOs in collaboration with Local Governments can organize promotion related activities such as product demonstration, awareness raising, behavior change campaigns etc.

Table 14 Key stakeholders for facilitating the scale up of electric cooking in Nepal.

Type	Name	Roles
Government ministries and departments	Federal	<ul style="list-style-type: none"> Preparing plans and policies Monitoring and oversight Infrastructure upgradation Ensure technical standard Tariff regulation
	<ul style="list-style-type: none"> Nepal Electricity Authority (NEA) Ministry of Energy, Water Resources, and Irrigation (MoEWRI) 	

	<ul style="list-style-type: none"> • Department of Electricity Development (DoED) • Electricity Regulatory Commission (ERC) • Alternative Energy Promotion Center (AEPC) • National Planning Commission (NPC) • Ministry of Forests and Environment • Ministry of Health & Population • Nepal Bureau of Standards and Metrology (NBSM) • Municipality Association of Nepal (MuAN) • National Association of Rural Municipality in Nepal <p>Provincial</p> <ul style="list-style-type: none"> • Ministry of Physical Infrastructure and Development (MoPID) • NEA provincial offices 	
Donors and Development Programs	<ul style="list-style-type: none"> • Asian Development Bank (ADB) • Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH • World Bank (WB) • Foreign, Commonwealth and Development Organization (FCDO) • European Union (EU) • Swiss Agency for Development and Cooperation (SDC) • Japan International Cooperation Agency (JICA) • Government of Finland • United Nations Development Program (UNDP) • Renewable Energy for Rural Areas (RERA) • Energising Development (EnDeV) • CCA Nepal • Nepal Renewable Energy Program (NREP) • Millennium Challenge Corporation (MCC) 	<ul style="list-style-type: none"> • Invest in electric cooking projects for research & development along with implementation • Support in technology transfer
Private Sector	<ul style="list-style-type: none"> • Distributors and manufacturers (Chaudhary Group, Baltra, Him etc.) • Suppliers (ABF, NACEUN) • retailers 	<ul style="list-style-type: none"> • Import or manufacture the technology • Purchase technology from distributors/manufacturers and supply to local retailers or sell directly to consumers
Non-Government Organizations and Media	<ul style="list-style-type: none"> • Practical Action • Renewable World • Winrock International 	<ul style="list-style-type: none"> • Project Implementers

	<ul style="list-style-type: none"> • PEEDA 	
Associations and Research Organizations	<ul style="list-style-type: none"> • Renewable Energy Confederation of Nepal (RECoN) • NACEUN 	<ul style="list-style-type: none"> • Mass promoters
Financial Institutions	<ul style="list-style-type: none"> • NMB Bank • Nepal Investment Bank • Rastriya Banijya Bank • Agriculture Development Bank • Prabhu Bank • Civil Bank • Small Farmer Development Microfinance Financial Institute Ltd. • Janautthan Samudayik Laghubitta Bittiya Sanstha Ltd 	<ul style="list-style-type: none"> • Provide wholesale loans to distributors and manufacturers
Academic Institutions	<ul style="list-style-type: none"> • Tribhuvan University • Kathmandu University 	<ul style="list-style-type: none"> • Research and Development
Consumers	<ul style="list-style-type: none"> • Residential 	<ul style="list-style-type: none"> • Adopters of the technology

4.6. Social Inclusion and Gender

Social inclusion

A total of 50 households including 20 from disadvantaged groups and 30 belonging to open group were selected for this project. The 20 households that represent the disadvantaged groups were selected in consultation with the municipality and includes Dalits, marginalized indigenous groups, Muslims, other minorities communities (List of 20 households under disadvantages group is attached as an annex of this report). Further, considering the inability of the marginalized group to pay for the cost of EPC, 80% of the EPC cost was subsidized for the vulnerable household by the project and other remaining 20% of the cost was also provided by the municipality. Likewise, out of 5 enumerators, 3 were female.

Gender

The past clean cooking promotion initiatives have focused on improving traditional cookstoves, using biomass and biogas stoves and cooking with LPG. However, electric cooking has now become a viable option for an increasing segment of the population as the most suitable clean cooking option. Cooking at household level is still considered as a task for women and girls in Nepal. The responsibility of collecting biomass for cooking is borne mostly by women and girls. To save time spent on collecting firewood and cooking, women and girls require easy and efficient technology for cooking.

Impacts of electric cooking on gender dynamics

As per the response recorded at the time of exit survey, majority of women and girls noted that EPC has helped them save their cooking time and allows them to engage in other works like taking care of their children, cleaning house, working in kitchen garden, etc. while cooking with EPC. This project has placed women and girls at the center of the project design, implementation, and monitoring process. Women and girls were included in the awareness events and orientation program about e-cooking. Live demonstrations were held in the local community to encourage women and girls to use EPC instead of collecting firewood and cooking with a traditional biomass cookstoves. As stated by many women in exit survey, male members of the family have also shown interest for cooking with EPC and in some

households, they have found cooking meat and other food items in EPC. They said that cooking with EPC was so easy that their sons and husbands have also shown interest to cook.

Males are often the ones who decide on the acquisition of all small and large household appliances. Keeping this in mind, men and boys were also included in live demonstrations alongside women and girls in order to persuade them to purchase EPC to make their lives easier and safer. Out of 5 enumerators chosen, 3 were female to collect data and assist in maintaining the cooking diaries which eventually helped women to share cooking knowledge and mutually empower one other. Furthermore, by involving women and girls in these activities, our organization has helped to achieve Goal 5 of the Sustainable Development Goals, which states, "Achieve gender equality and empower all women and girls."

5. Next steps

The next step for Winrock as an organization will be to use the results of the project to upscale the use of EPC in other areas of the country.

The results of this pilot study are useful to local, provincial, and federal government along with federal ministries like Ministry of Forest and Environment and Ministry of Energy, Water Resources and Irrigation, provincial ministries like Ministry of Physical infrastructure and Development etc. and the Government agencies like Nepal Electricity Authority and Alternative Energy Promotion Centre. Nepal Government (GoN) and its relevant institutions have made electric cooking a top priority. The GoN has made a target of at least one electric cooker in each household all over the country. Induction and Infrared stoves are already being promoted and EPC being more efficient than those two, this study will provide them additional option in terms of technology. The easy handling of EPC and requirement of less electric power might make it easier for adoption and wider uptake. The results will also be useful to donor organizations as well as national and International non-government organizations working in the sector of clean cooking as all these organizations have clean cooking as their priority sector. The results will be shared to these organizations via 3 levels of dissemination workshops conducted at local, provincial, and federal level. Besides, the results will also be published in the web portal of Winrock international and shared through social media.

6. Conclusions

Winrock International implemented a pilot project in collaboration with REWSSPC and Katahariya municipality at ward no. 2 and 3 of Katahariya municipality, Rautahat Nepal. The main aim of the pilot study was to assess the consumer's preference on the adoption of Electric Pressure Cooker, willingness to pay, preferred financial mechanism and the impact of EPC's use on the existing electricity infrastructure. The findings of the study showed that once EPCs were introduced into the community, the uptake of electric cooking increased from hardly 1% of all dish level heating events in the baseline phase to 25% in DAG households and 20% in general households during the transition phase. About 34% of all heating events during the monitoring phase consisted of EPCs. The use of EPCs in the endline phase declined to 15% in DAG households and 17.5% in general households of all dish level heating events, indicating that cooking with electricity was partly sustained over the six-month pilot.

The EPC has reduced the use of LPG by around 10% in DAG households and 8% in general households of all heating events at dish level compared to baseline and endline phase. Similarly, EPC has reduced the use of biomass by around 5% in DAG households and 9% in general households of all heating events at dish level. Replacing firewood is harder in the study area because the households get firewood for free for most period of the year. Also,

EPC is not always suitable to cook some staple food such as roti (chapati) and other foods that require deep frying. Therefore, it is very unlikely that EPC will be able to completely replace other fuels. EPC with Firewood was primary fuel stacking observed in the area which suggests that EPC might replace LPG rather than Firewood.

Encouragingly, consumers have expressed their satisfaction with EPCs in terms of taste, easiness to handle, faster cooking time and lowest energy consumption and cost for cooking compared to other cooking devices. The consumers initially felt the upfront cost of the EPC was higher but after using for more than 6 months, more than 50% of the users expressed their desire to purchase the EPC at full cost whenever required. More than 90% of the users want to continue using the EPC however some of the users still feel that they will need some subsidies to purchase a new one. Absence of local service centre has made it difficult to repair even when there were minor issues in EPC like damaged power cord, fuse damage etc. Therefore, it is very important to have a local service centre.

Appendix

- Appendix 1: Cooking diary intensive
- Appendix 2: Cooking diary light
- Appendix 3: Exit survey questionnaire
- Appendix 4: Local Dissemination Workshop report
- Appendix 5: Provincial Dissemination Workshop report
- Appendix 6: Report on Market Assessment of Available EPCs in Nepal
- Appendix 7: EPC Flyer
- Appendix 8: EPC user's guidebook