

**Policy Recommendations on Promotion of
Improved Cook Stoves among Forest Dependent
Households in India as Feasible and Affordable
Option to Clean Cooking Energy**



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Abbreviations

BoP:	Bottom of Pyramid
BPCL:	Bharat Petroleum Company Limited
CDM:	Clean Development Mechanism
CISSD:	Care India Solutions for Sustainable Development
DBC:	Double Bottled Connection
FBC:	Forest Based Communities
FDHs:	Forest Dependent Households
fNRB:	Fraction of Non-Renewable Biomass
GTC:	Gender Transformative Change
GHGs:	Green House Gases
HPCL:	Hindustan Petroleum Company Limited
ICS:	Improved Cook Stove
IOCL:	Indian Oil Company Limited
LPG:	Liquefied Petroleum Gas
MMTPA:	Million Metric Tons Per Annum
OMCs:	Oil Marketing Companies
PMUY:	Pradhan Mantri Ujjawala Yojana
PSU:	Public Sector Undertaking
SHE:	Sustainable Household Energy
SHG:	Self Help Groups
UNFCCC:	United Nations Framework Convention on Climate Change
VC:	Value Chain

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Executive Summary

The benefits of clean cooking solutions are globally well understood and scientifically documented; however, a large proportion of the world's population still use polluting & inefficient cooking solutions that emit toxic smoke. The widespread use of traditional cookstoves poses serious risks to health and human wellbeing. It also is a global warming threat as they emit black carbon which is a highly potent short-lived climate pollutant.

Access to clean cooking energy solutions has the transformative potential to curb the health risks posed by traditional cookstoves while reducing the time spent by men & women to collect firewood. It is vital for economic, social and human development concerns. To be meaningful for the households, this clean cooking options must be efficient, available when needed, reliable, user friendly, safe & affordable. This will positively change the quality of life of potential users by reducing human drudgery & enhancing comfort. Access to a reliable and clean cooking options can also boost productivity and economic activity which in turn will create opportunity for jobs and additional incomes.

The BACHAT¹ project of CARE aims at promoting sustainable adoption of ICS among forest dependent households (FDHs) in Odisha and Chhattisgarh states. Towards this, the project is working directly with 10,000 women from FDHs, 200 women's collectives, and 2,000 men from FDHs in three project districts. The project adopts an incremental approach to increase the awareness of women on clean energy options for household use, facilitate acquisition of Improved Cook Stoves (ICS), financial and technical 'intervention's, and influence men and other stakeholders in the ICS ecosystem to be supportive of women's endeavors for clean energy transition. Towards this, the project has adopted an innovative, women-led extension methodologies and tools, and scout and engage women leaders from existing Self-Help Groups (SHGs) as Sustainable Household Energy (SHE)-Champions for peer influence and education on Sustainable Consumption and Production.

The aim of this current study was to suggest policy recommendations based on the primary and secondary data and sub-sector analysis as mentioned above on ICS adoption as feasible and affordable option for promoting clean cooking energy. The study was designed as a composite of primary data collection & analysis supplemented with secondary data analysis. During the field study and primary data collection, the issues related to ICS in the field were adequately captured and analyzed. It was seen during the study that the project has immensely benefitted to the participant households in terms of increased household income by productive use of the saved time, better indoor atmosphere and more attention for children's education as a result of using the Improved Cook Stoves.

However few of the findings of the study point towards inadequate awareness among the forest dependent households, lack of motivation along with poverty, lack of institutional mechanism and lack of access to financial instruments as reasons for low intake of ICS. In order to foster the massive uptake of improved cook stoves in the project districts, a multi-disciplinary and sustained set of actions were felt necessary such as improving IEC and BCC activities in vernacular language at project level, working towards convergence among different stakeholders including inter sectoral departments at district and state level, advocacy with MFIs, Banks and other financial institutions for financial inclusion services & advocating implementation of related government schemes and programs. This document attempts to analyze the existing primary and secondary information and recommend some of the actionable points, so that the adoption of ICS is improved among the poor and forest dependent households and help in designing expansion strategy of future projects.

¹ . CARE India - BACHAT project document

Chapter – 1

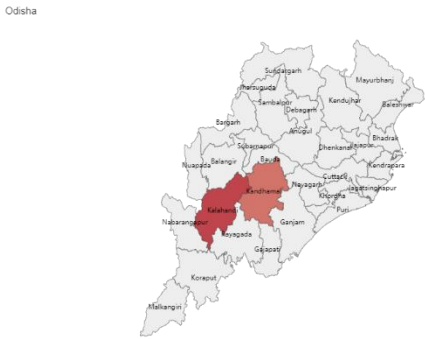
Background of the Study



Background of the study

Over 145 million Indian households use traditional cook stoves for daily cooking and depend on biomass (wood, dung, forest products) as fuel. This has significant implications especially on women's health due to household air pollution. A complex combination of factors like cooking traditions, intra-household distribution of incomes and gender dynamics, culture and affordability affect sustained adoption and use of Improved Cook Stoves (ICS) in the country. Low demand discourages suppliers from investing in ICS and suitable financing options for consumers and entrepreneurs are unavailable. These limit the transition of poor households to clean cooking energy options.

The BACHAT project of CARE aims at promoting sustainable adoption of ICS among forest dependent households (FDHs) in Odisha and Chhattisgarh states. Towards this, the project is working directly with 10,000 women from FDHs, 200 women’s collectives, and 2,000 men from FDHs in three project districts. The action is engaging with and influencing around 100 ICS Value Chain (VC) actors (e.g. financiers, ICS manufacturers and suppliers, distributors, retailers, field technicians) for strengthening the VC and making it inclusive through grassroot level women/men entrepreneurs’ participation. Besides, it is adopting innovative, women-led extension methodologies and tools, and scouting and engaging with women leaders from existing Self-Help Groups (SHGs) as Sustainable Household Energy (SHE)-Champions for peer influence and education on Sustainable Consumption and Production.



The project ‘Evolving a Women-centered Model of Extension of Improved Cook Stoves for Sustained Adoption at Scale’ aims at promoting sustainable adoption of improved cook stoves among forest dependent households (FDHs) in Odisha and Chhattisgarh states. Both Chhattisgarh and Odisha states have a substantial poor and tribal population (Chhattisgarh- poor 45% and tribal 31%; Odisha- poor 36% and tribal 23%) who are largely forest dependent. Forests in these states are the main source of fuel wood for cooking for around 19 million residents. The Switch Asia II project of CARE India aims to increase the adoption of sustainable lifestyles among Forest Dwelling Households (FDHs) in the Indian State of Odisha and Chhattisgarh. The action adopts an incremental approach to increase the awareness of women on clean energy options for household use, facilitate acquisition of Improved Cook

Chhattisgarh



Stoves (ICS) financial and technical ‘intervention’s, and influence men and other stakeholders in the ICS ecosystem to be supportive of women’s endeavors for clean energy transition.

In order to realize the objectives of SWITCH Asia II initiatives following activities were undertaken.

- I. Conduct situational analysis; Identify and engage ICS manufacturers, suppliers, banks and other VC actors; Select suitable ICS options available; Develop new ICS options for testing and adoption by women.
- II. Train and develop Sustainable Household Energy (SHE) Champions and SHE Influencers; Promote SHE-Schools; Support SHE-Champions in organizing SHE-Schools; Design customized ICS financial products with SHGs.
- III. Organize Men-Women Energy Interfaces; Organize door-to-door IEC campaigns to inform and influence men; Felicitate couples who emerge as ‘early adopters’; Organize Rural Orientation for ICS VC actors; Organize ICS Buyer-Sellers Meet
- IV. Train women as ICS VC entrepreneurs (including SHE Technicians); Organize Bank-VC entrepreneur interface events.
- V. Set up a Technical Core Group for SHE; Organize consultation and dissemination workshops especially with key stakeholders like State Level Renewable Energy Development Authorities in Chhattisgarh and Odisha (CREDA, OREDA) and National Biomass Cook-stove Initiative (NBCS) & prepare discussion papers and policy briefs.

CARE India Solutions for Sustainable Development (CISSD) or as widely known CARE India, is the oldest (working since 1949) and one of the largest pan India development agencies supporting Government of India and state governments to address livelihood, health, nutrition, education, gender and disaster response issues. CARE India is focusing on alleviating poverty and social injustice. Supported by donors like European Union and Tata Cornell Institute for Agriculture and Nutrition and organization’s own resources, CARE India is working in Odisha with Forest Based Communities (FBCs) and empowering Forest Dependent Households (FDH) to achieve Gender Transformative Change (GTC) oriented livelihood, household energy efficiency with reduced carbon emission, forest protection, health, climate resilient agriculture and nutrition outcomes at the household level.

1.1. Context:

A large proportion of people in rural areas depend on biomass fuels such as wood, animal dung and crop residues for cooking and heating. It is estimated that 86% of the rural and 24% of urban households depend on biomass as the primary energy source. According to World Bank, the indoor pollution thus created due to cooking with biomass causes 5,00,000 deaths, 550 million incidents of illness and the loss of 16 million years of healthy life among women. As a result, some 3.5 billion people all over the world, mostly in rural areas are exposed to high levels of air pollutants in their homes. The World Bank has designated this as one of the four most critical environmental problems in developing countries.

Carbon dioxide emissions are costing the Indian economy up to USD 210 billion every year, according to the global study which found that the country is likely to suffer highest economic damage from climate change after the United States². The Government of India is promoting Liquefied Petroleum Gas (LPG) as the cleanest form of household cooking energy through the ‘Pradhan Mantri Ujjwala Yojana’ (PMUY) for poor and marginalized Households (HH) in India. As a commitment under the Sustainable Development Goals (SDG), post the Paris Declaration and keeping up to the Kyoto Protocol; Government of India’s

² <https://economictimes.indiatimes.com/news/economy/indicators/co2-emissions-cost-india-usd-210-billion-every-year-study/articleshow/65961331.cms>

efforts are to reduce carbon emission at the Household level and contribute to SDGs in terms low and affordable clean cooking energy access to all households in the country. India's pledge under the Paris Agreement is to reduce the carbon intensity (the major contributing factor to about 70% in India is the energy sector) of its economy by 33-35% by 2030 compared to 2005 levels. Towards this direction the Government is taking all initiatives including covering up to 60% subsidy to cover net cost to support economically vulnerable population in the country transit to LPG replacing traditional and bio-mass based energy source. The current efforts are to empower women and protect their health, reduce health hazards/diseases and air pollution caused by using unclean fossil fuels.

While the Government of India is committed to work on the supply side, a look at the demand side complications is required. Nearly 40% of world population i.e., an estimated 3 billion individuals (World Bank, IEA 2017) currently remain dependent on solid fuels (e.g. traditional biomass such as wood, crop residue, and dung) to meet their household cooking energy requirements everyday (Arnold et al, 2003, International Energy Agency 2016, World Bank, IEA 2017). Of this, around a quarter of the global population that is 800 million people live in India and are dependent on traditional biomass, contributing thereby to about 26.60% of total final energy consumption in India³. The national fuelwood saved due to increased LPG access between 2001 and 2011 was approximately 7.2 million tons⁴. On aggregate, estimation is that a net emissions reduction of 6.73 CO₂eMt due to the fuelwood saved from increased access to LPG, when both Kyoto and non-Kyoto climate-active emissions are accounted for have been possible including assumption that 0.3 as the fraction of non-renewable biomass (fNRB) being harvested. The efforts to increase access to LPG leads to imports, with estimation of reaching to around 14 million metric ton of LPG import in the financial year 2018-19.

Currently India has an estimated population of 1.35 billion⁵, covering 17.74% of world's population with 66.8% of the total estimated population of the country living in rural areas. Out of the total rural population and a less significant number of urban population access to clean household cooking energy at affordable price is the priority for the government.

Public Sector Units Oil Marketing Companies or OMCs (IOCL, BPCL and HPCL) together have 259.5 Million customers registered with them out of which 256.8 Million customers are in the domestic category⁶. Nearly 44.4% of total registered domestic customers have double bottle connections (DBC). All these customers are being served by OMCs through 19,469 LPG distributors. Out of 256.8 Million registered domestic customers, 218.6 Million customers are active customers. The LPG coverage of the country estimated on the basis of active domestic connections and estimated household is around 79.2%. OMCs have a total of 189 LPG bottling plants all over India with rated bottling capacity of around 16.7 Million Metric Tons Per Annum (MMTPA). OMCs sold nearly 15.0 Million Metric Tons (MMT) of packed domestic LPG during April 2017- December 2017. As on 31.12.2017, approximately 22.69 Million new domestic customers have been enrolled by OMCs during April 2017-December 2017 out of which 12.57 Million were enrolled under Pradhan Mantri Ujjwala Yojana (PMUY). To cater to the increased customer base, 683 distributorships were added by OMCs during April 2017- December 2017.

³ Environmental Payoffs of LPG cooking in India- D Singh, S Pachauri and H Zerriffi, IOP, 2017

⁴ Petroleum Planning and Analysis Cell, Ministry of Petroleum and Natural Gas, Government of India, March 2018

⁵ <http://www.worldometers.info/world-population/india-population/>

⁶ <http://www.ppac.org.in/WriteReadData/Reports/201802221141024777342LPG01Jan2018.pdf>

With the above figures from Ministry of Petroleum and Natural Gas, it is fairly evident that an estimated 218.6 million active domestic customers (of which 44.4% have double bottle connections) and 12.57 million new customers added to the existing domestic category under the Pradhan Mantri Ujjwala Yojana (PMYU), there are 38.83 million households which are either not active customers or are using kerosene or bio fuel or some other form of energy as household/domestic cooking energy. There is evidently a gap between supply and demand in the domestic cooking energy sector.

The Government of India recognizes the gap on supply side and is in efforts to increase access to clean cooking energy. However the economic cost of imports with constant rupee devaluation, setting up the infrastructure, distribution channel and last mile delivery including time cost, besides cost of subsidized access to support affordability adds up to the carbon emission and financing cost for the economy. Accordingly, alternative mechanisms to support poor and marginalized households access clean energy other than existing biofuel, fossil fuel or renewable bio-mass sources needs to be addressed to reduce burden on the natural sources like forests and on the overall the impact of carbon emission on the economy, climate and health. With a clear mandate from the government for promoting LPG as alternative cooking fuel for one and all in the future for the forest dependents and poor and marginal people fuel wood will still remain the biggest source for cooking for obvious underlying reasons mentioned above. Hence efforts should be on to make cooking through fuel wood efficient (thermal efficiency i.e. combustion) and environment friendly (less of smoke and emission of GHGs). Improved cook-stoves are a step towards such move.

In India, cooking accounts for over 80% of the total household energy consumption, and biomass is a predominant cooking fuel for 78% HHs in rural areas (*Source: National Sample Survey of India, 68th Round, 2013-14*). Fuelwood is one of the main forest products used by the poor Forest Dependent Households (FDHs) and its use has increased over the period. High dependence on firewood for cooking and heating in India and resultant biomass burning has found to be responsible for around 2,67,700 deaths in India, or nearly 25% of the deaths attributable to PM2.5, making it the single-most important anthropogenic source related to mortality in 2015. (*Source: State of the Decentralized Renewable Energy Sector in India, 2017-18, Clean Energy Access Network*). While the govt. has made efforts to provide LPG connections to poor households under the PMUY scheme, the cost of refills continues to be a significant barrier for households to use LPG. In spite of the subsidy directly transferred to the beneficiary bank account against the refilling, they still have to pay for around 50% of the remaining price for each refilled cylinder which is still a higher paying price compared to their income and the availability of free natural fuel from forests. As a result, majority of the beneficiaries of the scheme do not use the LPG regularly besides the problem of poor supply chain in the remote areas. Hence, for the FDHs dependency continues with biomass based cookstoves. Till other affordable clean cooking technology alternatives become accessible for FDHs at the Bottom of the Pyramid (BoP), improving extension and adoption of Improved Cook Stoves (ICS) continue to offer a solution in the near term.

With this background the project envisages to conduct one dipstick study on the policies, guidelines and framework governing the entire ecosystem of promoting efficient, clean energy in household cooking mechanism through improved cookstoves and other technology.

Chapter – 2

Objectives of the Study



Objective of the study

The key objective of the consultancy is to scope for policy recommendations on ICS adoption as feasible and affordable option for promoting clean cooking energy and reducing carbon emission including impacts on deforestation and health at the domestic level.

The above study was completed with the help of complementary assessment surveys, based on a review of the shared documents of CARE, academic literature and current best practices identified within the Care project locations.

The primary aim of the study is to suggest policy recommendations based on the primary and secondary data and sub-sector analysis as mentioned above on ICS adoption as feasible and affordable option for promoting clean cooking energy.

The primary study and analysis was done on the following aspects:

- Affordability and last mile connectivity related costs and challenges faced by the beneficiaries enrolled under PMUY in project geography.
- Carbon emission costs and financing costs in ICS manufacturing and distribution down to the doorstep through ICS manufacturers, distributors and entrepreneurs/ retailers at rural level
- The possibility under government and private sector market in promoting cook stoves with innovations in technology, combustion efficiency, price-competitiveness, and supply chain issues

The secondary data analysis was done on the following aspects:

- Impacts, potentiality, challenges and current status of the existing policies and programmes related to promotion of improved cook stoves.
- Influence of domestic carbon emission on India’s overall carbon emission segment from all individual and cumulative estimate from major sources of cooking energy at household level namely- LPG, kerosene, coal, biofuel and renewable biomass.
- Revenue and subsidy impact on promotion of PMUY towards increasing accessibility to LPG as clean cooking energy in the domestic segment



Study methodology

Broadly the study methodologies were focused at Policy study, Field visit to 3 districts, individual interviews, Information collection through structured questionnaires, Data analysis, Facilitating FGDs, Key Informant Interview (KII), Interaction with individuals using different cook stoves (LPG, ICS, Traditional Chula etc.)/Staffs /Supplier /Local partner NGO/ Energy Entrepreneurs etc. At each project district, at least 3 villages were covered wherein 3 Focus Group Discussions (FGDs) and 2 Key Informant Interviews (KIIs) took place.

The study was initiated with the review of secondary information and reports shared by CARE India along with the online available documents followed by an initial round of discussion on a road map for the study with the state office of CARE India at Bhubaneswar. The broad road map for the study is outlined as under:

- Preparation of FGD checklist and broad discussion points for the qualitative study
- Selecting 11 sample villages from among the program villages spread across three different districts in consultation with the state office of CARE India for the study
- Roll out the study in selected 3 villages based on the approved FGD and KII questionnaires (Conducting FGD with 15-30 people and KIIs with appropriate stakeholders; ensuring involvement of at least 50% women in FGDs)
- Analysis of the study findings and preparation of draft report after completion of field work in the state.

Sampling Methodology

Three districts Jashpur (Chhattisgarh), Kalahandi & Kandhamal (Odisha) were selected for the dip stick study. The proposed samples were equitably distributed between Jashpur (Chhattisgarh), Kalahandi & Kandhamal (Odisha) districts.

Selection of villages

In Jashpur (Chhattisgarh), Kalahandi and Kandhamal (Odisha) districts, 11 villages were identified based on random sampling methodology for the study. The consultant has put thrust on covering different blocks to have a broader picture of the intervention.

Interaction with the stakeholders were basically divided into three parts such as focus group discussions (involving at least 50% women), Key Informant Interviews with key stakeholders of the project (at least 2 KII in each project location) and household visit for deeper understanding of the issue.

The study was comprehended with the field study and analysis of existing related documents provided by CARE India. Extensive secondary study of policies and schemes of the government, research papers and presentations on ICS were also referred for this study.

Qualitative tools for the study

Tool 1: Focus Group Discussion – Mixed Group (50% Women and 50% Men)

Estimated time of completion: 120 minutes.

This Interactive tool was developed by the consultant in consultation with the CARE India to collect data on the level of adoptive and transformative capacity in the community under the BACHAT project. The FGD questionnaire included a combination of closed and open questions to understand the prospective of the community on the program and identify the issues therein pertaining to:

- Access
- Ease of use
- Impact on health, livelihood, education etc.
- After sales service
- Issues with scaling up
- Resource convergence

Tool 2: Key informant interviews

Estimated time of completion: 30 minutes.

This Key Informant Interview questionnaire developed under the study broadly aimed at understanding the penetration of the program and the issues at each level. This is broadly designed to understand the gaps in project implementation, analyze the external factors of influence and the need identification for future programs of similar nature.

Chapter – 3

Study Findings

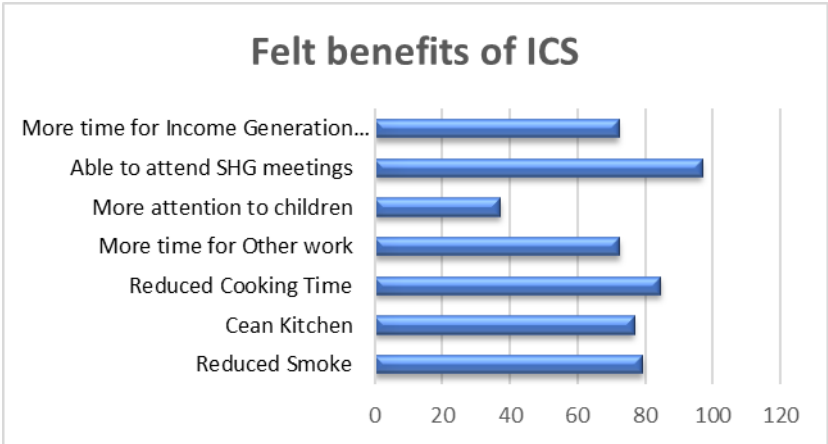


Study findings

In our part of the world, cooking is often associated as an act of sanctity where invasion of modernity in cooking has always been proved to be difficult. Considerable amount of persuasion and perseverance is the only key to bring about a change in the traditional cooking atmosphere. The BACHAT project of CARE was carefully engineered to increase the acceptance of improved cook stoves in the poor and less endowed regions of Odisha and Chhattisgarh and bring in **Positive changes** in the lives of the participating households especially in the domains of **Gender, Health, Livelihoods and Education** across all the program locations.

3.1. Benefits seen through Gender Lens:

During the study it was evident that the Improved Cook Stoves have remarkably reduced the fuel consumption and associated drudgery to fetch firewood to the extent of 50%. Women in most of the participating households are predominantly engaged in collection of fuel wood from the nearby forest walking around 4

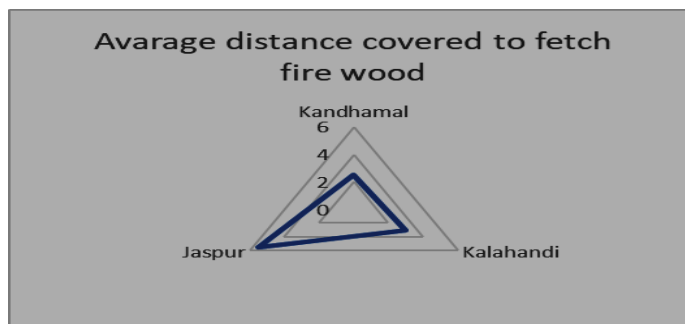


to 12 KMs amidst the loss of productive time & with the fear of animal attacks. With reduction of fuel consumption, collection of fuel has been less frequent and there has been decrease in load per trip. It has been reported by the women that as the fuel needs has decreased substantially and that there is no need for them to go far for collection of fuel wood. In fact the ICS has addressed the practical gender needs.

Use of Improved Cook stove has reduced cooking time substantially compared to that of traditional mud stove. As a result; women of the households could find more time for leisure and get themselves engaged in social activities along with secondary income generation activities. The respondents in all the interactions across three districts expressed that they could regularly attend the SHG meetings due to availability of more free time from cooking.

Improved Cook stoves have provided the women more flexibility of cooking food anywhere; inside and outside their home. It is reported by the women that they prefer to cook their food under the morning sun on a wintery morning and under shade in summer. Women in some locations pointed out that they carry the cook stove even to the farm field where they carry on agricultural operations and cook their food simultaneously. It not only saves them from the burden of carrying food to the field but also helps the women contribute their labour in the field.

Since cooking has become relatively easier with ICS compared to the traditional mud stoves, with lesser emission of shoot & smoke; men at times lend their helping hand to the women in cooking. ICS has bridged the gender gap to some extent; breaking the gender-based division of labour in the participating households.



3.2. Benefits seen through Health Lens:

Access to Clean Cooking Energy and Electricity – Survey of States (ACCESS) report mentions about as many as 95.0 percent of rural homes across Bihar, Jharkhand, Madhya Pradesh, Odisha, Uttar Pradesh and West Bengal still use traditional fuel, such as firewood, dung cakes and agricultural waste for cooking. Only 14.0 percent households in rural areas across the six states surveyed used biogas, LPG, electricity or natural gas as their primary source for cooking. More than 67% of rural households in India still depend on firewood or wood chips for cooking. Biomass based cooking creates health related issues. wood, charcoal and other solid fuels (mainly agricultural residues) are often burned in open fires or poorly functioning stoves. Incomplete combustion leads to the release of small volatile particles and other constituents that have been shown to be damaging to human health.

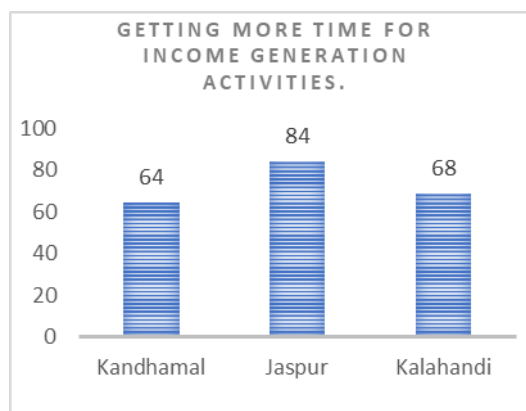
ICS compared to traditional mud stove produce much lesser smoke, shoot & toxic emissions. The women users who participated in the interaction said that cooking has become more convenient as there is less smoke emitted while cooking. Needless to mention; use of ICS reduces the burden of health hazards on women. Since most of the households don't have separate kitchen, cooking is mostly done either on the veranda or in the corner of the living room. It has been found that most of the households using ICS at present have reduced the use of traditional mud stove. With the flexibility of ICS, women change place of cooking as per their convenience. As a result not only the women but also other members of the households have become less vulnerable to health hazards related to indoor air pollution.

Most of the respondents said that in earlier days when they were using traditional mud stoves they required a large quantity of fuel wood and it was difficult for them to collect it frequently. They used to collect fuel wood when they had time for it and stacked them close to their house. Snakes (often venomous) took shelter in those stacks and there were cases of snake bite while trying to pull out the wood from the stack. With the use of ICS, need of fuel wood has been reduced substantially and households using ICS no longer keep fuel wood in stacks. As a result; threat of snake bite has also been reduced.

3.3. Benefits seen through economic Lens:

With the decrease in fuel needs almost by half, participating households who used to buy fuel wood spend almost half the amount that was spent earlier. As a result, households could save money for productive spending on food, health and education of their children.

More than 70% of the respondents agreed that there has been substantial saving in this regard after introduction of ICS. Women of the households spend less time for cooking on ICS against cooking on traditional mud stove. The time thus saved is often spent on other income generating activities such as bidi making & making of leaf plates and leaf cups. The requirement of less fuel has resulted in increase in their monthly earning since they could save about 6-8 days on an average in a month due to less need for wasting their time in fetching firewood from the forest.



3.4. Benefits seen through an Education Lens:

As there is less emission of smoke in cooking with ICS resulting in a lower indoor air pollution and the cook stove can be carried to any place at will; children find the home more comfortable to pursue their studies. Some of the participating households also cited that a considerable portion of the money which is saved on account of lesser fuel needs is being spent on children’s education.

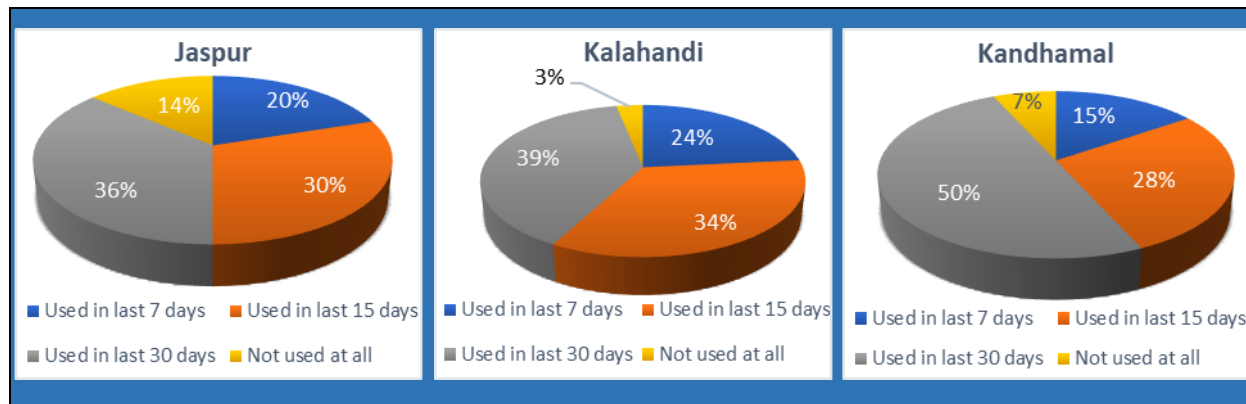
3.5. Key factors in the study area that drives the adoption of ICS

- **Type of food:** The type of food determines the fire power of the stove, in some cases it was observed that the ICS is being used to cook a portion of their cooking. Most of the beneficiary households still depend on TCS for cooking the cattle feed and cooking the rice (in Odisha) for the family.
- **Location of Cooking:** There are diverse examples of cooking locations in one household. In some families the cooking location is fixed while in some cases it is not. The seasonal variation also impacts their choice of cooking locations. In those households where the cooking locations were not fixed, ICS was the used more often.
- **Quantity of food:** This depends on the size of the family, where the size of the family is big the use of ICS is restricted to few items like curry or other non-staple items.
- **Fuel Feeding habit:** the fuel for cooking varies from large logs to small twigs and farm residues. In some cases it was observed that household feeds large logs in to the TCS and simultaneously continue doing other household chores along with cooking. Since ICS needs feeding in frequent intervals and there is a specific way to execute the same, some families found TCS more convenient against ICS.
- **Size of the cooking utensil:** This parameter is linked to the quantity of food to be cooked, the bigger the family the bigger is the pot. ICS has a recommended dimension of the utensils, when there is a need to cook for more people then TCS becomes the preferable mode.
- **Posture while cooking:** While most women in rural parts prefer cooking in a sitting position, sometimes women need cooking while standing, even while seating the height of the ICS per user varies. In this case the height and portability of the stove are decided by the posture of the user.

3.6. Issues to ponder:

During the study, some of the interesting parameters related to ICS were captured which are summarized below

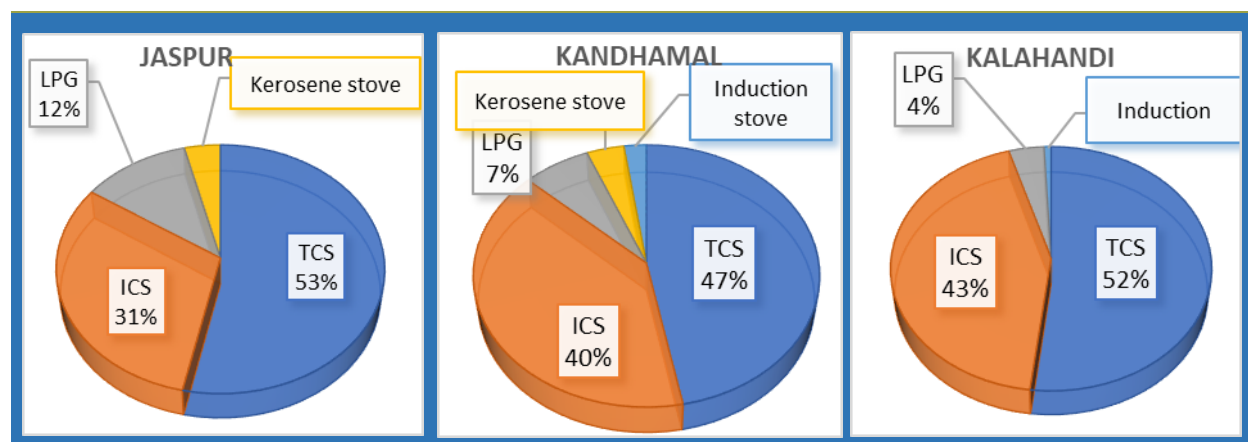
Table 1: Usage of various cooking medium in last one month of the study



Despite considerable knowledge & awareness about the ICS and its benefits, the pattern of usage suggests that in many households the ICS is not being put to regular use. In Jaspur, about 14%, in Kandhamal about 7% & in Kalahandi about 3 % of ICS have not been used at all and those ICS that is in use is not been used regularly. Less than a fourth of the ICS were found to be used in last 7 days of the study. It is interesting to note that many households are not using ICS as their primary mode of cooking, this scoured use of the improved cookstoves may not be due to a single factor rather a combination of several factors have impacted their cooking behaviour (Please refer Chapter-4).

This strange behaviour of the ICS users were further probed, and the results are depicted below; where many of the households are resorting to different modes of cooking as per their convenience, it is interesting to note that about 50 % of the users are resorting to traditional mud cook stoves while few have experienced cooking over LPG stoves and only about 35% households are using the improved cookstoves in a regular manner.

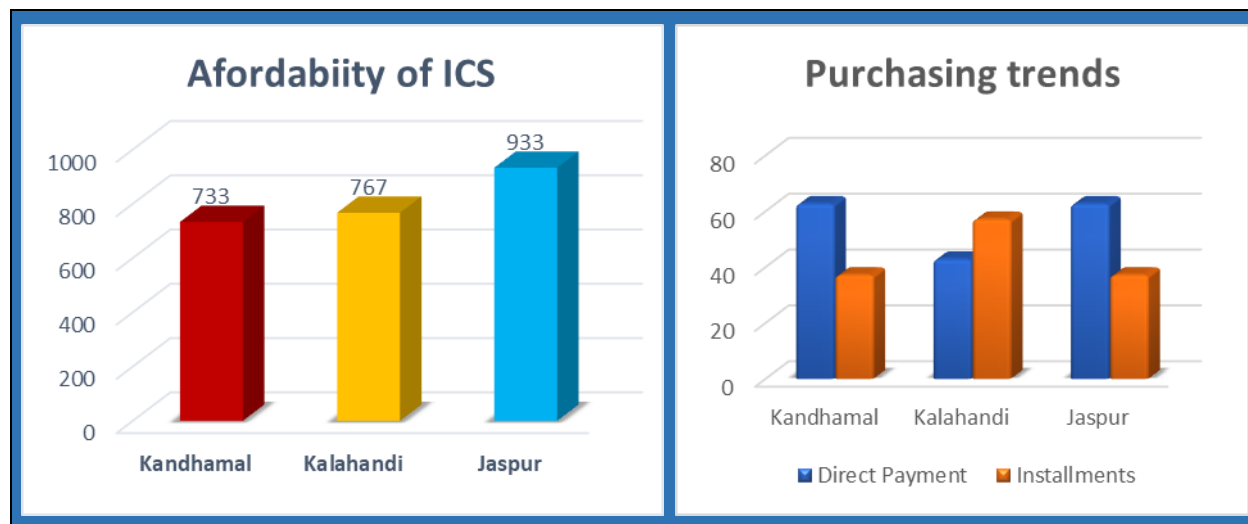
Table 2: Cooking pattern among beneficiary Household



While probing about the magnitude of affordability of a cookstove by different communities, one thing came clear that the different communities have differential purchasing power in different states, While

in Kandhamal and Kalahandi districts of Odisha have a lower purchasing power from the range of Rs. 700 to Rs. 800, communities in Jaspur have little higher purchasing power of 900-1000 per Improved Cook Stove. This was evident while analyzing the purchasing trends in both the states. While more households in Jaspur could afford direct purchase of the ICS with a single payment mode, communities in Kalahandi preferred the instalment modes to purchase the ICS.

Table 3: Financial aspects of ICS adoption



3.7. Challenges in Adoption of ICS

The districts of Kandhamal and Kalahandi in Odisha and Jaspur in Chhattisgarh are historically backward in human development indices and cradle sizable number of poor and tribal households. Propagation of improved Cook Stoves in these districts need a careful strategy which may be a combination of efforts in both supply and demand sides. Careful thought should be given to reduce the financial burden of the end users of the ICS. From the study it was evident that there is a strong need to rope in various resource and necessary attempts need to be made to work closely with the government, MFIs, Banks, NGOs and corporate bodies in order to bring a synergy between them for a cause.

Some of the issues identified during the study are outlined below.

- The level of awareness among the participating households about the benefits of ICS needs substantial improvement.
- Intensive engagement with the existing SHGs and village level groups for popularisation of ICS needs to be taken seriously.
- Development of a low-cost & EMI model for the ICS for the households needed more attention since it holds the key for gearing up of uptake of ICS
- The greater the number of choices - the more the confusion at the users' end. Thus, a smaller number of choices of ICS (affordable and reliable) may be a good strategy for limiting the confusion.
- Sales & Service has been a prominent issue for the participating households, particularly in the remote villages. Lack of sales and service point near the village/panchayat demotivate the user.

There were few external factors beyond the project preview which also needs to be accounted.

- MFIs are not interested to support such a small amount for ICS (Rs. 1000 to Rs. 1500)
- Since central Govt has initiated PMUY program, government in the state (Odisha) is not interested to promote or propagate clean cooking solutions for political reasons
- NGOs and INGOs working across the project locations had their own priority and never came up with projects to promote ICS
- The corporate bodies in the state have not made much systematic effort to use their CSR funds on ICS and allied activities

Table 4: Summary of field findings on aspects affecting adoption of ICS

- State of confusion over the different models of ICS demonstrated and disseminated
- Miscommunication about the defunct ICSs which affect the interest of people
- Availability of Sufficient fuel wood near the villages and no physical money spent in fetching them
- Affordability aspects relating to cost of ICS in a non-existing provision for instalments/EMI
- Low access to credit market and low level of financial linkages for ICS
- Subsidy or financial instrument to reduce the cost if ICS is virtually not available
- Fading up of knowledge percolation & awareness generation activities over a period of time
- Level of motivation among SHE champions is low thus they are not taking interest to scale up
- Since ICS is fed with wood chips and small pieces of wood, due to harvesting seasons people do not invest time in fuel processing
- Reluctance to spend time to sit and cook constantly since ICS need more attention than TCS
- Less awareness on availability of after sale service for ICS
- Some cook stoves were found to be of poor quality which is getting damaged within 2 to 3 months of regular use thus the word of mouth about the quality deters others to pursue ICS
- The ICSs were designed for smaller families thus bigger families did not find it useful
- Not able to maintain temperature of food after cooking.
- Under the PMUY, the LPG is apparently free of cost and ICS looks costlier in comparison, since the beneficiaries of PMUY do not calculate the refilling cost.
- Ease of use: the TCS are easy to start but ICS need some efforts to start, this is often demotivating
- Absence of local manufactures of after sale services in the region affect supply chain
- Absence of local stockists; households don't get the product when they need (especially during the harvesting season when they have money)
- No financial support to local entrepreneurs for scaling up
- Absence of regular monitoring and follow up action
- Preference by household to use ICS as a supplementary system instead of primary means of cooking, in most cases the ICSs were kept for use in the emergency only
- Difficult terrain and scattered inhabitation also contributed towards low level of monitoring
- Community extension program along with localized IEC activities and IEC materials lacking

Case-1: Sujata a classic tale of awareness



Sujata Konhar, a resident of Dandikia/sanagadu village of the Taladandikia GP of Phiringia Block. She is a SHE champion, lives in a modest house with her family. In earlier days, Sujata used to have Traditional Mud Stove for cooking as there was no other ways known to her. Now she uses Agnika cooking stove regularly. She prefers the ICS over the traditional mud stove as it takes lesser time, lesser fuel and emits lesser smoke compared to that of the TCS. She adds that the Agnika stove provides the convenience of cooking anywhere and it needs lesser fuel wood than TCS which is the basic reason for her choice of ICS over TCS. She adds that collection of fuel wood has always been a problem for her even though the forest is nearby. Since the TCS requires too much of fuel wood i.e. nearly 2-3 quintals per month, she had to go to collect it very often. Earlier she had to go twice in a week for the purpose. Now since the requirement of fuel has been reduced to one quintal a month, she now pays only one visit to the forest in 10 days which is sufficient for use in

ICS. Sujata says that use of new technology has helped the household in many ways such as; there is lesser dependence on fuel, lesser time is spent on collection of fuel, lesser money is spent on fuel, there is lesser threat of health problem, more time for rest/leisure, there is scope for engagement in income generation activities. ICS helped to protect forest and environment as well.

3.8. PMUY- A reality check:

Data from the Petroleum, Planning & Analysis Cell (PPAC) shows that over 55 per cent of the addition of distributors in 2016-17 has been skewed towards urban and urban/rural. Of the 10,000 new distributorships planned under PMUY in 2016-17, the process was initiated for only 3500.

Cooking on LPG stoves is something which rural consumers (APL) aspire for, however the LPG promotion as the main fuel for cooking has certain limitations such as;

- **Cost of fuel:** The cost of refills after getting the LPG connections is a significant barrier for rural households. It is being observed that the regular refilling of cylinders of PMUY beneficiary household is not happening.
- **Fuel Stacking:** Fuel Stacking is a regular phenomenon in the rural households, where consumers often use a combination of stoves for cooking. Use of LPG is restricted to meet the urgent needs (restricted to use during rainy days or preparing tea and snacks) this has been acknowledged in the national energy policy as well where the analysis of energy security scenario predicts that 35% of rural households will be reliant on biomass for cooking by 2032 and 20% by 2047. A study by *Dabadge, Sreenivas and Josey in 2018* reveals that PMUY consumers are using less LPG (60-70% less) in comparison to the other LPG users.

- The Petroleum Planning and Analysis Cell (PPAC) data shows that the average number of distributors per 1 Million consumers are in a declining trend with the onset of aggressive LPG popularisation schemes like PMUY. At the moment there are only 65 distributors per 1 Million households in rural areas (PPAC-2018). Since some of the rural distributors of the LPG serve the consumers over an area of 20-25 KM² the consumers in the interior pockets are accorded with less priority.

For households using LPG, (4-12% households in the project villages) the median one-way distance to procure an LPG cylinder ranged from 3 km in Jaspur to about 17 km in Kalahandi. Rural LPG distributors also face the risk of encountering low demand for refills, due to affordability constraints of newly connected rural households. Interesting to note that more than 50% households which were beneficiary of PMUY have never refilled their cylinders since last 2 years. Even after receiving the PMUY kit, some households never opened and used them. The probable reasons are captured in the following table

Table 5. Reasons for low uptake of PMUY in the project areas

<ul style="list-style-type: none"> • Low level of awareness & Inadequate IEC activities; Users are not sensitized on the sustainability aspect and the eco friendliness of LPG • Cultural issues; people belief that the food cooked over LPG is not suitable for offering • Distant LPD distribution points & loss of man days in fetching the refills. Availability of full cylinder at distribution points is not ensured always, as a result some people even spent the whole day and returned empty handed • Upfront payment for refilling the cylinders makes LPG visibly a costly affair • Transportation cost of cylinder add to their burden, about Rs. 200 to Rs. 300 spent to refill the cylinder. • Availability of plenty of natural fuel around village which is virtually free • Fear of explosion and fire mishap • Lack of knowledge on technical aspects of LPG for repairing or shifting to another place • Confusion over the ever-fluctuating rate of refills • Dependence on the technically sound person in the neighbourhood for connecting the stove to the cylinder often demotivates households to use on a regular basis (especially for families with elderly, single & aged women) • LPG was found not useful for big families since big utensils do not fit over the stove • LPG was not useful for boiling water for cattle feed • Several cases of subsidy money not reaching to the beneficiary bank account • Households have resorted to cooking on LPG in Emergency situations and small-time usage such as preparing Tea, breakfast for children during winter and rainy seasons. • A small damage (switch and regulator issues) made them worried and demotivated

Case story 2: Damodar Kahar, a classic tale of Ignorance



Damodar Kanhor, a resident at Paderipada village of Upara Dandakia Gram Panchayat, Phiringia Block of Kandhamal District. Damodar is a proud owners of LPG stoves under PMUY since November 2017. However, he has not opened or used the LPG since then. While discussing with him it was noticed that his family is very comfortable using ICS. Upon probing the cause of the non-use of LPG he cited that he feels that the ICS is more convenient due to Less smoke, less cooking time, and less fuel use etc. The factors of not using LPG are broadly for upfront payment for refilling, availability, and risk of accident. During the study it was understood that the LPG adaption picture is discouraging at all the 3 project districts in 2 states. Many PMUY beneficiaries have not even opened the LPG kit & many have not completed the use of 1st cylinder, some households stopped using LPG after exhausting the 1st cylinder and kept it without refilling further.

Chapter – 4

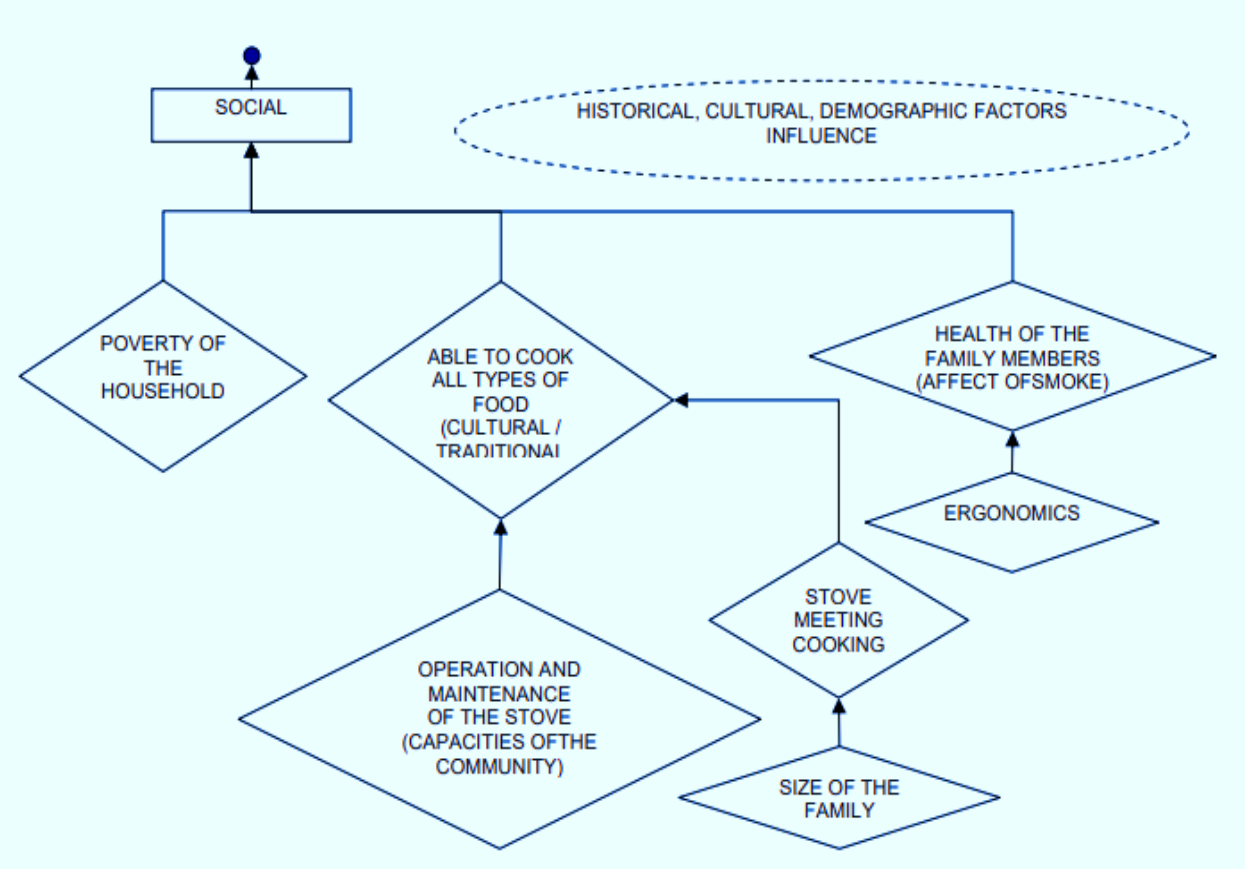
Factors Affecting Adoption of ICS

Factors Influencing Community Adoption of ICS

Improved biomass cookstoves projects are being prioritized nationally and regionally. A review of the cook stove projects reveal the poor state of adoption of improved biomass cooking technology and a multitude of inadequately understood factors that drive adoption. There are numerous variants of ICS available in the Indian market varying by cost, source of draft(air) type of fuel used, mode of fuel loading, materials used, stove efficiency etc. many ICS are technology specific focusing dissemination efforts on a few pre-selected models of ICS. However the suitability of the type of ICS technology depends on various contextual specifications. The following are few of the parameters/factors that influence decision making of communities for adoption of ICS and contributes to its sustainability.

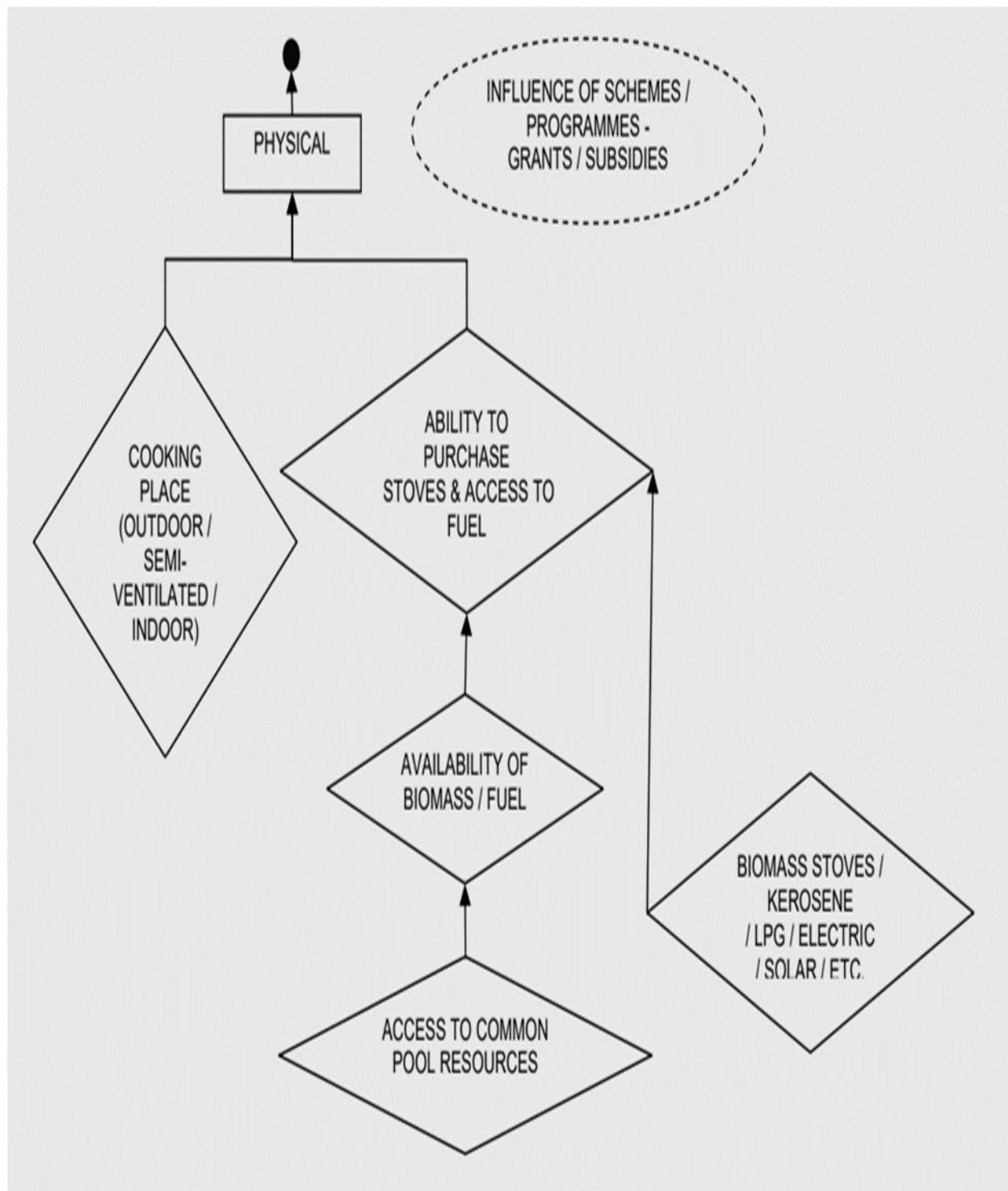
4.1. Social factors influencing adoption of improved cook stoves

The predominant influencers that falls under the social factors are Historical, Cultural, Demographic in nature. The following schematic diagram tells about few of the important factors. Under the social factors the past History of cook stove usage, cultural attributes, Demographic factors etc. act as influencers.



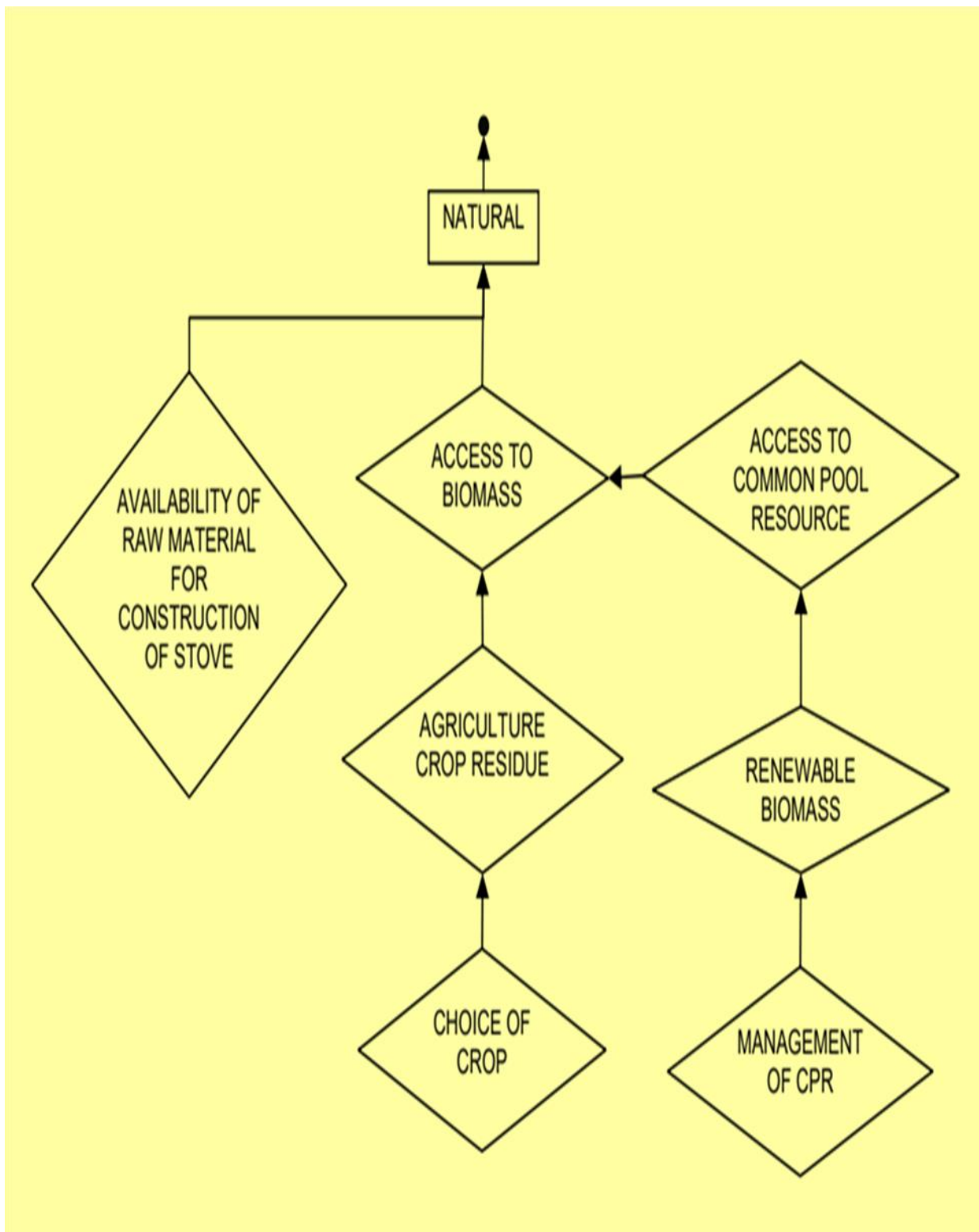
4.2. Physical factors influencing adoption of improved cook stoves

The physical factors that influence the adoption of an improved Cook Stove predominantly takes in to account the physical attributes of the cookstove, such as variety of choices, make, model, dimension of cooking space availability of biomass etc. The physical factors are also influenced by different sponsored schemes, programs, grants etc.



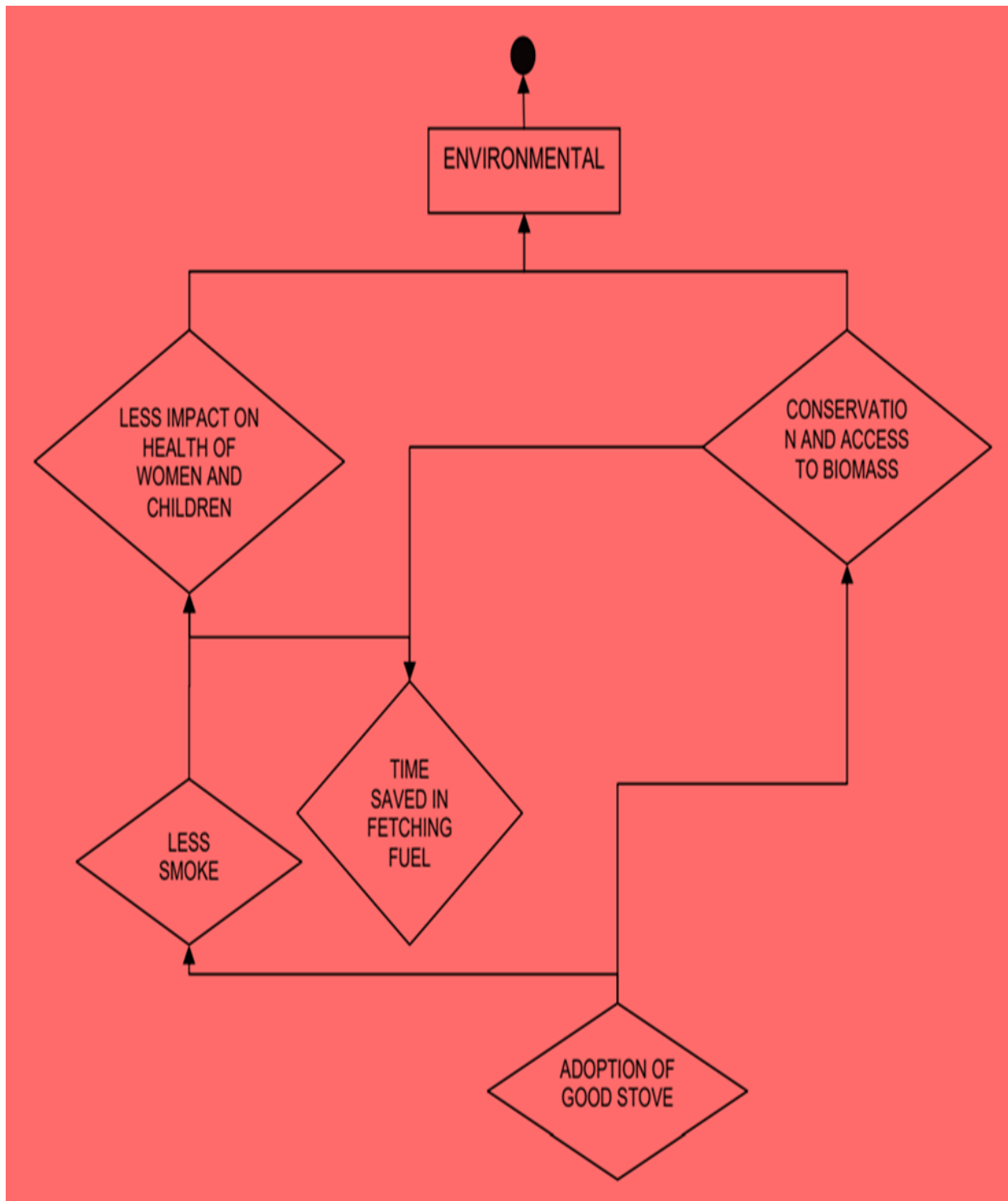
4.3. Natural factors influencing adoption of improved cook stoves

There are some natural factors that influence the adoption and sustainability of Improved Cook Stoves, the following is a schematic representation of those factors.



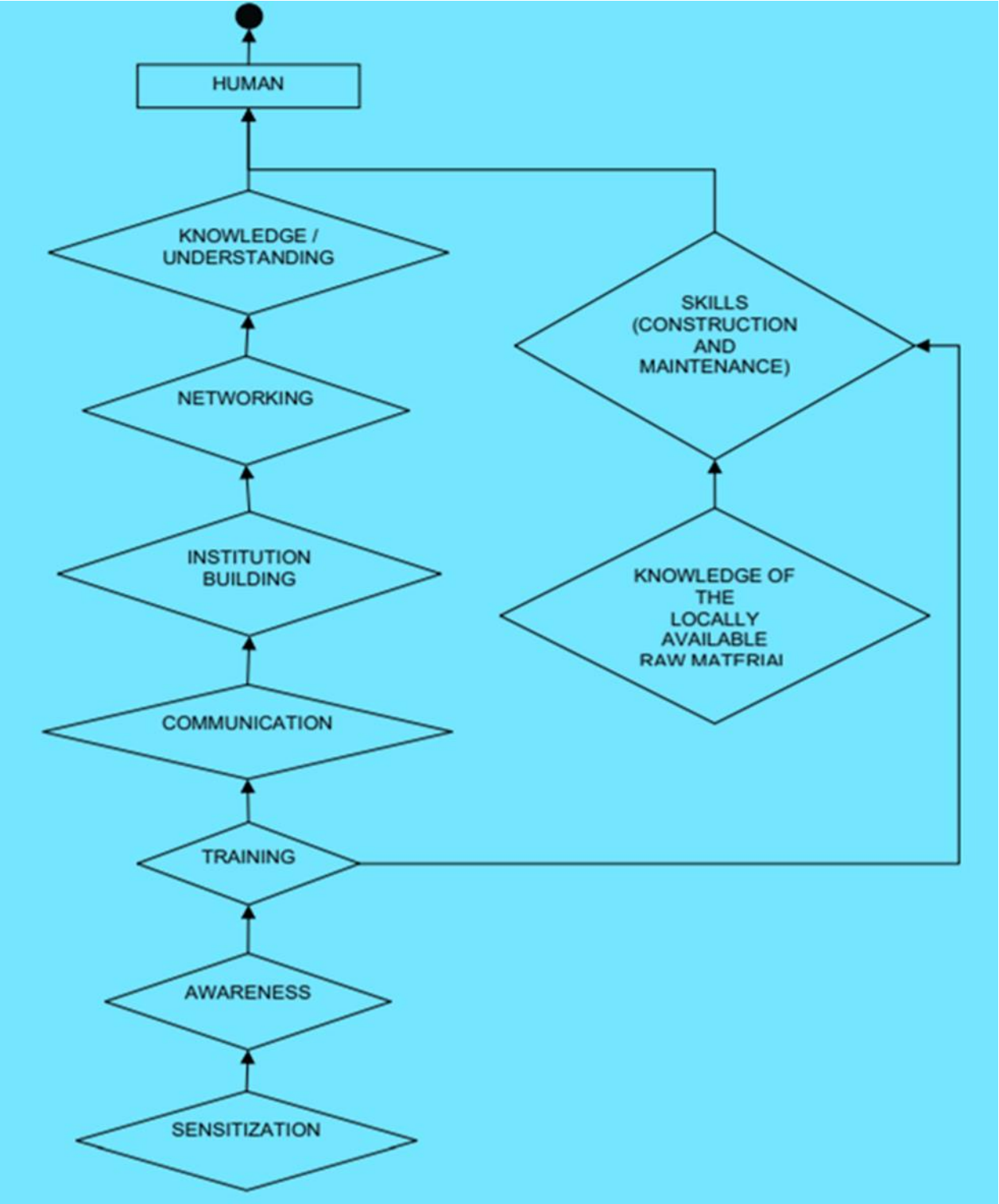
4.4. Environmental factors influencing adoption of improved cook stoves

The environmental factors that affect the adoption of Improved cook stove are depicted in the following schematic diagram.



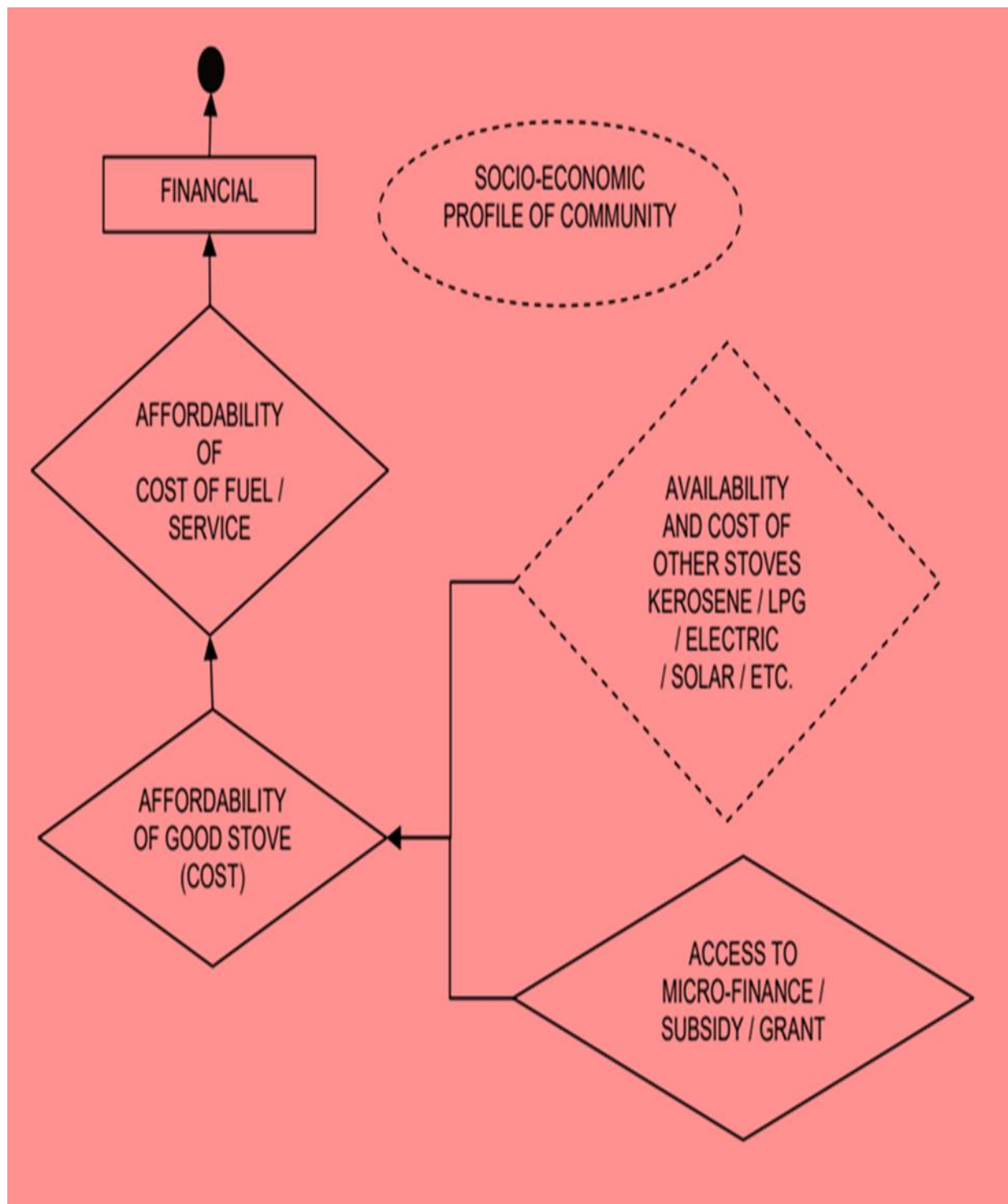
4.5. Human factors influencing adoption of improved cook stoves:

The human factors are one among the prominent factors that determine the sustainability of the ICS program, building awareness and building skill are critical components therein.



4.6. Financial factors influencing adoption of improved cook stoves:

Financial factors are one among the most important factors that affect the adoption of ICS. Socio-economic profile of the community which determines affordability and access to credit services are the key components.



Source: Factors Influencing Community Adoption of Good Stoves, Dr. Sai Bhaskar Reddy https://sae.eethz.ch/wp-content/uploads/2015/08/GEO_PCIA_2008_Reddy.pdf

Chapter – 5

Policy Framework in the Clean Cooking Sector

Policy framework in the Clean Cooking Sector

The two recent policies in relation to the growth of LPG which has a direct bearing on the consumption of fuelwood, are mentioned below:

- India formulated a new exploration licensing policy (NELP) in 1998 to allow private and joint venture companies to enter into the arena of oil and gas exploration.
- In the Hydrocarbon Vision-2025, finalised in 2000, it is proposed that 45% of the total energy needs of the country will be met through hydrocarbons by the year 2025, compared with the existing contribution of 42%.

5.1. National Biomass Cookstoves Programme (NBCP)

National Biomass Cookstoves Initiative (NBCI) was launched by Ministry of New and Renewable Energy (MNRE) on 2nd December 2009 with the primary aim to enhance the use of improved biomass cookstoves. The initiative stressed the setting up of state of the art testing, certification and monitoring facilities and strengthening R&D programmes. The aim was to design and develop the most efficient, cost effective, durable and easy to use device.

The NBCI of MNRE was structured differently from the earlier National Programme on Improved Chulhas (NPIC), although building on the several successes of that programme as also drawing lessons from the experience gained from its implementation. Under this initiative, a series of pilot scale projects were envisaged using several existing and better cookstoves and different grades of processed biomass fuel.

5.2. Unnat Chulha Abhiyan Programme

As a follow up to the National Biomass Cook-stove Initiative (NBCI), the Ministry initiated a new proposal for promoting the development and deployment of Unnat Chulhas (Biomass Cookstoves) in the country during the 12th Plan Period for a budgetary cost of Rs. 2.94/- Billion appraised and recommended by the Expenditure Finance Committee. Accordingly, the Administrative Approval with detailed Guidelines for the Unnat Chulha Abhiyan were formulated and issued on 27th June 2014 with the following objectives:

- To develop and deploy improved biomass cook-stoves for providing cleaner cooking Energy solutions in rural, semi-urban and urban areas using biomass as fuel for cooking.
- To mitigate drudgery of women and children using traditional chullah for cooking.
- To mitigate climate change by reducing the black carbon and other emissions resulting from burning biomass for cooking.

5.3. The National Biogas and Manure Management Programme(NBMMP)

The National Biogas and Manure Management Programme is a Central Sector Scheme primarily set up for rural and semi-urban households. Categories are designated accordingly, cattle-dung and other bio-

degradable materials such as biomass from farms, gardens, kitchens, and night soil. They delineate the benefits of biogas as well:

- It provides clean gaseous fuel for cooking and lighting.
- Digested slurry from biogas plants is used as enriched bio-manure to supplement the use of chemical fertilizers.
- It improves sanitation in villages and semi-urban areas by linking sanitary toilets with biogas plants.
- Biogas Plants help in reducing the causes of climate change.

5.4. Carbon Finance on Biomass Cookstoves

The cookstoves market is still at the nascent stage and manufacturers have had limited ability to realize economies of scale to lower prices to consumers. While subsidies could be an option to increase affordability for the most disadvantaged, offering similar pricing structures to the market at large may be unrealistic. Against this background, it was recognized that carbon finance may offer an additional alternative for reducing the price and increasing the affordability of improved biomass cookstoves for low-income households. Switching to Improved biomass cookstoves can displace greenhouse gas emissions related to fuel use. To the extent that accepted protocols have been put in place and verify avoided emissions, these can be sold as carbon offsets on the voluntary and Clean Development Mechanism (CDM) markets. The hope is that revenues from the sale of such offsets will allow cookstoves suppliers to market these devices at a lower price, thereby expanding sales. Encouragingly, offsets generated from cook stove projects are reportedly among the most sought after among voluntary offset purchasers. With these considerations, the Ministry in collaboration with GIZ, Germany has developed a Programme of Activities (PoA) for CDM in biomass cookstoves and was submitted to UNFCCC for registration on 31st of December 2012. The CDM Programme of Activities (PoA) has been registered with a registration date of December 2012. The credits generated from the PoA are eligible under EU-ETS. The PoA for CDM in biomass cookstoves will continue as envisaged until the project completion in the year 2039 however there are few technical and non-technical parameters that are affecting the emission trading market pertaining to Cookstoves. However, the CDM market is flourishing for other renewable and clean energy projects.

5.5. Pradhan Mantri Ujjwala Yojana (PMUY)

Pradhan Mantri Ujjwala Yojana is an ambitious social welfare scheme of Central Government launched on 1st May 2016. Under the PM Ujjwala Yojana, the government aims to provide LPG connections to BPL households in the country. The scheme is aimed at replacing the unclean cooking fuels mostly used in the rural India with the clean and more efficient LPG (Liquefied Petroleum Gas).




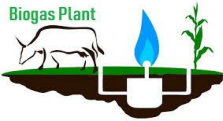
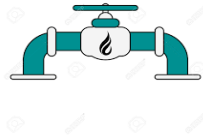
Ujjwala Yojana is aimed at providing 80 Million LPG connections in the name of women in BPL (Below Poverty Line) households across the country. The scheme will be implemented over a period of three years.

5.6. Growth in Fuelwood Production

Fuelwood has remained the dominant source of household energy in rural India. Since the implementation of the social forestry and large-scale afforestation programmes, the area of production of fuelwood has gradually shifted from forests to non-forest areas (*M.S.Swaminathan Research Foundation status report on use of fuelwood in India*). A lot of fuelwood is now being produced from trees planted along roads, canals, farmlands and wasteland. Actual production data at the national level from both the sources are however lacking. An assessment of tree resources outside the forests of a few states has revealed that the quantity of fuelwood estimated to be produced from outside forests and wastelands is quite sizeable.

Further, measures taken by the Government to conserve biodiversity and existing forest resources has resulted in an increase in restricted areas where removal of fuelwood is not permitted. The ban on felling trees in many state forests has reduced the production of round wood from forests with a consequent adverse impact on recorded fuelwood production. Since the area under forests is not likely to expand due to competition with agriculture and other land uses, in future most fuelwood will be produced from outside forests, farm forestry and common wastelands.

Table 6 : Planned and estimated investment by fuel or technology in India

Fuel or technology	Estimated Investment
 <p>LPG</p>	The government aims to provide LPG connections to 95 per cent of the households in India by 2019 and foresees an investment of USD 4.6 billion in LPG infrastructure including import terminals, pipelines and bottling plants. PMUY has expanded the LPG penetration to 86 per cent of the households. State owned oil companies plan to add 47 new LPG bottling plants over the next two years, expanding the total capacity to 21 million tonnes to 2018-19. The budget allocation for LPG subsidies in 2016-17 was USD 2.9 billion
 <p>Electricity</p>	The Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY) with a budget of USD 12 billion aims to ensure 100 per cent rural village electrification by 2019. A newly launched scheme Pradhan Mantri Sahaj Bijli Har Ghar Yojana (SAUBHAGYA), aims to invest USD 2.5 billion to ensure universal household electrification by 2018
 <p>ICS</p>	Based on the India Energy Security Scenarios (IESS), 2047, about 20% of all rural households in India will continue to rely on traditional biomass for cooking in 2047. Assuming these households use ICS for cooking, the investment in manufacturing and assembly of ICS alone (at current average prices of natural draft cookstoves USD 18) would be USD 1.2 billion. CLEAN estimates the largest enterprises in the sector will require USD 1.5 million, USD 9 million in equity and USD .76 million in grants between 2017 and 2020
 <p>Biogas</p>	Over USD 9 million will be required for subsidy payments alone if MNRE were to meet all its biogas targets (65,180 plants) in 2017-18.
 <p>PNG</p>	Projected demand for PNG in 2030 as estimated by Petroleum and Natural Gas Regulatory Board (PNGRB) is 44.6754 Million standard cubic feet per day (MMSCMD) from the existing sales/supply of 8.57 MMSCMD in 2016-17. This will entail investment in additional capacity for pipelines and distribution. The government plans to connect 10 million households to PNG network by 2020, from the existing 3.3 million. India is targeting USD 100 billion worth of investments in the natural gas sector by 2022. This will include investment in gas infrastructure including an addition of 228 cities to the existing CGD network.

Source: Council on Energy, Environment & Water

Chapter – 6

Policy Recommendations

Policy recommendations

The BACHAT project of CARE India has initiated a transformative change in the lives of the participating households which was observed during the study. The project could make inroads into a geography which was predominantly dependent on forest for their cooking needs. Looking at the encouraging outcomes of the project it is evident that similar action may be taken in other regions of the state as well as country. The study understands the necessity of convergence and concerted efforts of multiple stakeholders working hand in hand to extend an improved cooking lifestyle to the forest dependent households through ICS at one hand and relieving the burden on the forest for firewood and contribute towards climate action on the other hand. The following are some of the recommendations outlined based on the study that may be helpful in achieving the bigger goal.

At state level

- Constant advocacy with the Government for appropriate implementation of the available schemes. (working closely with Odisha Renewable Energy Development Agency (OREDA), Green Energy Development Corporation of Odisha (GEDCOL), Department of Forests, Department of Panchyati Raj & Department of Energy etc.)
- Advocating for use of Compensatory Afforestation Fund Management and Planning Authority (CAMPA) fund in promotion of ICS among forest dependent households.
- Advocating inclusion of Skill development curriculum on making, repair and service for ICS for youth under DDUGKY
- Advocating the use of existing village/GP based infrastructures such as PDS centers/LAMPs/Rajiv Gandhi Sewa Kendra for propagation of ICS to the community
- Building inter sectoral Convergence: Among Government-Corporate-NGO partnership for a cause
- Pursuing regular interface with corporate stakeholders on climate change and role of ICS
- Undertaking Research and development focusing on the local needs and aspirations and designing stoves accordingly. (standardization of ICS)
- Since Carbon trading on ICS will be helpful in reduction of the price of ICS and improve offtake, necessary advocacy may be undertaken for simplifying the process of access to carbon credits in ICS
- Establishing centre of excellence with one or more technical universities for research and development of ICS fitting to the local context
- Initiating R&D with the support of technical institutions and entrepreneurs for biomass briquette making

At Project Level

- Simplification of process of facilitation in implementation of the ICS programme & Incentivizing the SHE champions and cook stove promoters
- Facilities should be created for awareness in every village, Rigorous BCC activities and promotion of IEC in local language with more pictographics could be more useful
- Regular interaction at district level with MFIs, Banks and Mission shakti institutions for extending a hand of support for popularizing ICS. Rigorous engagement with Women SHGs looks more useful
- Strategy development for resource mobilization from Government, private and corporate stakeholders
- Organizing Sharing seminars among government and civil society for cross learning of good practices and models on ICS

Way forward

Popularizing ICS among the forest dependent households, especially where many households are below poverty line and the education and awareness level is abysmally low, is certainly a challenging task. Numerous dimensions pertaining to ICS both in the supply side and the demand side need to be carefully reviewed and the strategize the project activities according to the needs holds the key for success. The current study reviewed the BACHAT project and could arrive at certain recommendations pertaining to the project; however these recommendations holds the potential for wider use across others states as well as the country, since the issues (socio-cultural, behavioral, financial and accessibility) are more or less similar across all the states. The following are some of the takeaways of the study for strengthening future endeavors.

- Focus on building awareness through improved communication and behaviour change campaigns to influence adoption of clean cooking energy solutions.
- Adopting Integrated approach for adoption of ICS; to initiate convergence among different ministries/departments such as health, rural development, Environment & Forest, Panchayati Raj and Women and Child Development etc.
- Enhance affordability of solutions by reducing the cost of the fuel and cooking devices; providing consumer finance instruments through MFIs and Banks
- Act towards reduction of the upfront cost for households through innovative payment mechanisms such as pay-as-you-go and rental models.
- Set-up local manufacturing and servicing facilities to sustain prolonged use of clean cooking energy solutions, through improved accessibility and affordability.
- Regular data collection and evaluation of adoption and use of clean fuels and technologies to provide the much-needed evidence to inform future interventions.
- Advocacy for dissemination of Importance of eco-conservation and reduction of burden on forests. Chapters included in the school curriculum on improved cooking so that a child learns this and becomes a change agent at home and society.
- Collective effort towards standardisation of few but effective models of ICS to be promoted on the basis of quality, reliability, and affordability aspects.

Annexures

Tool for FGD:

Points to be discussed during interaction with Users/Stakeholders/FGD

Name of the District _____ Name of Block _____

Name of the village _____

Name/ of Respondents _____ Category of Respondents _____

Source of income of buyers _____ Economic status _____, Social status _____

1. Benefits of using ICSs. (Environmental, Social, Economic, Health, Gender, Education etc.)
2. Issues and concerns if any. Why ICSs are not adopted by people as expected
3. What you suggest for massive adaption of use of ICS?
4. What are positive & negative things you experienced while using ICS & LPG?
5. Strategies for supply effective chain management, Role of SHGs, creation of village level entrepreneurs.
6. After sales mechanism for addressing end users’ issues.
7. Status of awareness about ICS.
8. Stapes taken by the CARE for sustainable use of ICS and its adaption.
9. How others are influenced to purchase their own ICS.
10. Bottlenecks in Increasing outreach of CARE cook stove movement
11. Cooking fuel purchased prior to purchase of cook stoves under Switch Asia – CARE program: (Firewood, LPG, kerosene)
12. Cooking fuel collection prior to purchase of cookstove4s under Switch Asia – CARE program (crop residue, cattle dung, and frequency of collection in a month)
13. If you have LPG, when you refilled your last cylinder? _____
14. How many cylinders you have refilled last year? _____
15. What is the frequently of refilling? _____
16. If the frequency is low; Why you are not willing to refill LPG Cylinder? _____
17. What are the problems you are facing for getting LPG? what is the distance of distribution point from your village?
18. What are those problems you are facing for getting the ICS?
19. According to you which cook stove is Energy efficient, Convenient, Economical & Accessible
20. Involvement of other actors /Govt/NGOs /MFIs during project

Tool for KII

Points to be discussed during interaction with Users/Stakeholders/KII

Name of the District _____ Name of Block _____

Name of the village _____

Name/ of Respondent _____ Category of Respondent _____

Source of income of buyers _____ Economic status _____, Social status _____

1. Technology installed under Switch Asia-CARE program: _____, _____, _____
2. How much did you pay per cook stove Rs. _____ MTP _____
3. From where you purchased ICS _____
4. Who supported to get the cook stoves: Bank, MFI, CARE, CSR, Govt. If loan from MFIs/Bank specify duration of loan, interest rate, and instalments/EMI _____
5. Cooking technology used before getting the cook stove under Switch Asia – CARE program (3 stone, Mud stoves LPG, Kerosene stoves, Biogas and Induction stoves etc.)
6. Cooking fuel purchased prior to purchase of cook stoves under Switch Asia – CARE program: (Firewood, LPG, kerosene)
7. Cooking fuel collection prior to purchase of cookstove4s under Switch Asia – CARE program (crop residue, cattle dung, and frequency of collection in a month)
8. If you have LPG, when you refilled your last cylinder? _____
9. How many cylinders you have refilled last year? _____
10. What is the frequently of refilling? _____
11. If the frequency is low; Why you are not willing to refill LPG Cylinder? _____
12. What are the problems you are facing for getting LPG? what is the distance of distribution point from your village?
13. What are those problems you are facing for getting the ICS?
14. According to you which cook stove is Energy efficient, Convenient, Economical & Accessible
15. Involvement of other actors /Govt/NGOs /MFIs during project
16. Any Govt Scheme/ program supported for expansion of ICS.
17. Corporate support for reducing end user price if any?

WORK PLAN:

The following is a date wise schedule of interaction with the users, key stakeholders for the study;

SL NO	Date of visit	State	District	Block	Village covered
1	10th to 12th Nov.19	Odisha	Kandhamal	Tikabali,	Birangi
				Phiringia,	Dandikia
				G. Udaygiri	Dalibadi
2	14th to 16th Nov.19	Chhattisgarh	Jashpur	Kunkuri	Kamar.
					Rentya .
					Dhoridang.
			Bagicha	Pandirpani.	
3	17th to 19th Nov.19	Odisha	Kalahandi	M. Rampur,	Upar nuagan.
				Bhawanipatna	Duked.
					Talaranchu guda.