

What's Cooking?: A Mixed Methods Study of Health Perceptions and Use of Improved

Cookstoves in Rural India

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Thesis submitted in partial fulfillment of  
the requirements for the degree of  
Master of Science in the Department of  
Global Health in the Graduate School  
of Duke University

2015

ABSTRACT

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## **Abstract**

The burning of biomass (wood, dung, charcoal, etc.) for cooking and heating is widespread throughout the world and is a major contributor to household air pollution (HAP). Biomass fuels are often burned in inefficient stoves and rooms with poor ventilation, contributing to respiratory illnesses, local deforestation, and global climate change. Improved cookstoves (ICS) are advocated as an effective remedy for the effects of HAP. In this study we examine attitudes associated with ICS and traditional stoves among households that purchased an ICS and households that did not. We employed a mixed-methods study between June 2012 and November 2014 in the Himalayan region of Uttarakhand, India. We conducted 2,038 household surveys and 28 in-depth interviews that included questions about environmental and stove-related perceptions, household socio-demographics, stove and fuel use, socio-economic characteristics, risk and time preferences and a 24-hour biomass fuel weighing exercise for monitoring of fuel consumption. This analysis focused on 1) cooking practices 2) stove and fuel use 3) positive and negative attributes of ICS and traditional stoves 4) perceptions of health changes from use of ICS and 5) knowledge of local diseases and health. Quantitative analysis consisted of multivariable logistic regressions with survey data and qualitative analysis employed applied thematic analysis of transcripts from primary cook interviews.

More than half of all households in the qualitative sample reported belief that there is no health impact from using an ICS. Smoke from traditional stoves is considered a normal aspect of daily life. Misconceptions of local diseases, causes, and cures are

pervasive and impact perceptions of health. Female respondents were most likely to comment on smoke as unsafe for their health and the cleaning requirement for their traditional stove as a negative feature. Respondents complaining of ICS fuel cost (including electricity bill) and relative wealth of the household were significantly related.

It is clear that households subjected to this stove promotion campaign remained unconvinced that smoke from cooking is an important threat to health. Therefore, we must target households using strong educational campaigns about the effects of smoke in the home, making clear that smoke does *not* have to be a normal aspect of daily life, and is a health threat that can be eliminated. Wide variation exists among ICS users and their reasons for using or not using the ICS, which suggests the need for additional research on preferences and perceptions before scaling up or implementing similar ICS interventions in this region. Future cookstove intervention programs will benefit from this improved understanding and help inform more effective design of future programs to enhance sustained use of ICS.

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# 1. Introduction

Half of the world's population relies on unprocessed solid fuels (wood, dung, charcoal, etc.) for household cooking and heating (Bruce, Perez-Padilla, Albalak, 2000). The health effects of burning biomass fuels for household energy needs include respiratory infections, pneumonia, ischemic heart disease, stroke, chronic obstructive pulmonary disease, and lung cancer, among many others (WHO, 2014). In 2012 alone, 4.3 million premature deaths were attributed to household air pollution (HAP) (WHO, 2014). Today, HAP is responsible for 7.7% of global mortality and is a leading environmental cause of death worldwide.

Fire, the center of holiday gatherings and recreational camping trips in the West, remains a daily necessity for those cooking with biomass. Burning solid fuels over a fire emits toxic substances; in enclosed areas this creates severe HAP, which has numerous effects on health, socioeconomic status and the environment (Mukhopadhyay et al., 2012). HAP is now recognized as a “modifiable exposure” which can be addressed using interventions focused on cooking practices, fuels, stoves, heaters, chimneys and behaviors (Gordon et al., 2014).

## 1.1 The Traditional Chullah

In India specifically, roughly 66% of households cook on mud stoves (Mukhopadhyay et al., 2012). The *chullah* is the traditional stove in India; fueled with biomass, it is shaped with mud, brick or dung like a “C” and fuel is inserted in the

opening (Figure 1). In some cases, no mud is used, and three stones or a metal tripod serve as the base.



**Figure 1: Traditional *Chullah* (Photographed during fieldwork, 2014)**

Households are exposed to numerous negative effects from using biomass fuels to cook inside the home (Figure 2). Those most affected worldwide by HAP are women and children (Jeuland & Pattanayak, 2012). Women are usually the primary cooks, spending hours prior to mealtime near a fire or stove. In many countries women cook with their children strapped to their back or in the room with them. For both women and children, sitting in a poorly ventilated room and breathing in smoke has detrimental health effects.

Respiratory infections, asthma, and pneumonia are only some of the consequences of high exposure to smoke and unclean fuel combustion. Acute respiratory infections account for 17% of deaths in children under five years old (WHO, 2014). Pneumonia is

the cause of more child deaths each year than any other disease (Smith et al., 2011). Epidemiological studies have demonstrated effects on eyesight as a result of smoke as well (Pokhrel, Smith, Khalakdina, Deuja, Bates, 2005; Saha, Kulkarni, Shah, Patel, Saiyed, 2005). These studies have associated indoor cooking and the use of biomass fuels with cataracts and, in severe cases, blindness.

On an environmental level, smoke from household fires accounts for one-third of the global human-caused black carbon emissions (Ruiz-Mercado, Canuz, Walker, Smith, 2013). Black carbon, a significant greenhouse pollutant, is a short-term contributor to climate change, a global environmental problem that is predicted to have many negative impacts in the future. Black carbon emissions are implicated in not only climate warming, but also glacier melting in the Himalayan Mountains (Bond et al., 2013; Ramanathan & Carmichael, 2008). Residential cooking with solid fuel is the second greatest source of black carbon worldwide, behind sources such as diesel engines and vehicles (EPA, 2014).

The use of traditional stoves has negative socioeconomic impacts. Women must spend time collecting fuel, which in some regions means hiking miles to and from the nearest forest. In some communities, women are subjected to sexual and gender-based violence walking alone for fuel in the forests (Lewis & Pattanayak, 2012). Such fuel collection is instrumental in deforestation, and the time spent could instead be devoted to income-producing activities for the family.

Possible Negative Effects of Use of Traditional Chullah

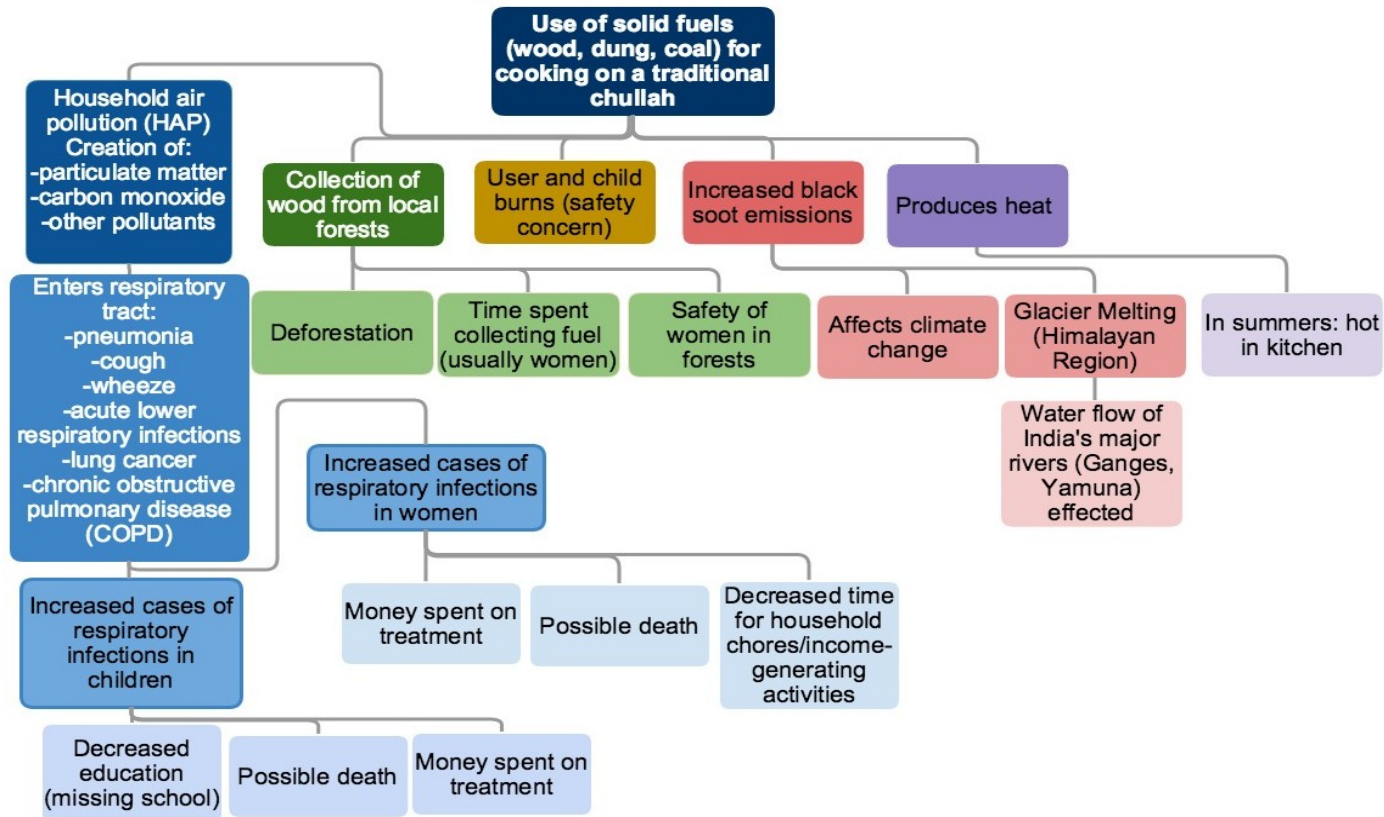


Figure 2: Negative Effects of Traditional *Chullah* Use

## **1.2 A Possible Solution: The Improved Cookstove**

According to the Global Alliance for Clean Cookstoves and the World Health Organization, as well as other indoor and HAP researchers worldwide, improved cookstoves (ICS) are an effective remedy for the negative health, environmental, and socioeconomic ramifications of HAP (GACC, 2011). Some ICS use alternative fuel sources, urging families to change from wood to electric or liquefied petroleum gas (LPG). Other improved stoves have cleaner burning processes or require less fuel (Jeuland & Pattanayak, 2012).

India implemented the National Program on Improved *Chullahs* (NPIC) in 1985. Approximately 35 million homes were outfitted with new chimneys and stoves (Venkataraman et al., 2010). Many independent evaluations of NPIC criticized the program because the stoves were underused and had poor durability. As of 2002, the Ministry of Non-conventional Energy Sources discontinued funding to NPIC and the program suspended all operations (Venkataraman et al., 2010).

Despite the deemed failure of the NPIC, there have been numerous international interventions to encourage the use of ICS. Some found high adoption rates, while others report low demand. Lewis and Pattanayak (2012) showed that rigorous studies of ICS adoption are scarce and many studies show income and education positively associated with adoption. Education levels of the head of household and primary cook, as well as price of firewood and household income were all positively related with cookstove adoption in one region in Ethiopia (Alem & Hassen, 2013). This relationship is worrisome, especially if many interventions target the poor. Additional variables, such as

cost of the ICS, design of the stove, etc., have not been studied systematically or extensively.

Adoption of ICS remains a major challenge. Researchers have identified numerous ways to induce adoption, but reasons for purchase or rejection vary culturally, socially, and economically among different geographic communities. Evidence on methods to induce adoption as well as characteristics of adopters has aided in intervention strategies. Levine et al. (2012) offered time payments, free trials, and the right to return the stove to households in Uganda and identified barriers such as liquidity constraints, concerns about savings and stove durability. The combination of offers (payment plan, free trial, right to return the stove) increased uptake by 45% (Levine et al., 2012). Jeuland et al. (2014) found that households in India were on average favorable of ICS with reduced fuel requirements, smoke emissions, and greater convenience.

Given the increasing success of promotion efforts that lead to households acquiring cleaner technologies, research and evaluation efforts have shifted to whether the use of these is sustained over time. Few researchers have returned to areas of intervention to measure stove use and health changes post adoption. Duflo, Hanna, and Greenstone (2012) continued to track households in Orissa, India for up to four years after stove adoption. The researchers ultimately found that households failed to use the stove over the long term and did not make necessary repairs or perform maintenance, which led to a decline in use over time. The researchers found a meaningful reduction in smoke over the first year, but no effect over the longer term. Similarly, they found households had a low valuation of the improved stoves. The authors urge for more

attentive impact evaluations of such projects and programs. Other researchers have identified “stove stacking”<sup>1</sup> upon return to ICS-owning homes, which is common worldwide (Ruiz-Mercado et al., 2013).

Past research sheds light on whether users understand and value possible benefits from use of ICS. Bielecki and Wingenbach (2013) describe differing perceptions of ICS post-adoption in a qualitative study in Guatemala. Village members used their traditional stove for more than simply cooking; it served as a social gathering point and for household heat and light. This case study revealed that the fuel-efficient design distributed in this region sacrificed cultural and social needs for efficiency. They conclude that engaging the user in the design process is imperative in designing a cost-effective, cleaner-burning model that would be used in the community.

Martin et al. (2013) note little demonstrated evidence of health benefits from most of the government, non-government, and multinational efforts. However, obtaining data from hospitals and clinics on respiratory illnesses can provide a biased framework because access to health services and characteristics of individuals seeking medical attention differ at many levels. The authors conclude that conducting qualitative research of preferences, choices and household behaviors is necessary to understand factors related to adoption. While many studies focus on barriers to adoption and behavior change, few address perceptions of ICS and health post-adoption. Further exploration of long-term use of ICS needed.

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<sup>1</sup> Stove stacking is a term commonly used for households using more than one stove; often households use their traditional stove as well as the improved stove for cooking, employing neither exclusively.

The aim of this study was to explore liked and disliked features of three different types of stoves as well as knowledge of local diseases and health among a local population. The study aimed to examine how these perceptions differ in households exposed to ICS marketing (treatment) and those who were not (control). We also explore whether households in rural Uttarakhand, India continue to use their improved cookstoves one year after purchase. This insight is important because it improves understanding of perceptions of ICS owners post purchase and provides information on aspects to include in future interventions.

## **2. Methods**

### **2.1 Setting**

The North Indian state of Uttarakhand, formed in 2000 when it separated from neighboring state Uttar Pradesh, is located in the foothills of the Himalayas (Uttarakhand: Government Portal, 2012). The Nainital district, eight thousand feet above sea level, is one of thirteen districts in the state of ten million people. Approximately 70% of inhabitants live in rural areas. This region is particularly vulnerable to the effects of climate change. The geographic location of the field site provides for interesting challenges in logistics. Many homes considered in the same villages are in fact miles apart, separated by large ridges and cliffs prone to landslides.

### **2.2 The Intervention**

An ICS promotion intervention was conducted in the fall of 2013 (see Figure 3, section 3). Households had been previously randomized (described in detail in section 2.4.1) at the hamlet level and all treatment households (n=771) within those villages were visited by sales teams with the option of purchasing two different types of stoves. Households not residing in treatment communities (control, n=292) were not given the intervention. The G-coil electric stove (Figure 4) and the Greenway Biomass stove (Figure 5) were sold with randomized rebates at the household level.<sup>1</sup> Enumeration teams presented households with an educational pamphlet (Appendix A) to introduce ICS and

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<sup>1</sup> Households were asked to randomly pick a piece of paper from a pile; the number randomly chosen was the rebate the purchaser received. Rebate levels were: a) Rs. 25 (US \$.50) b) Rs. 200 (US \$4) c) 1/3 of stove cost (Rs. 320 or Rs. 460 (US \$6.50 or US \$8.75), depending on stove).

explained the benefits (reduced smoke, time savings, firewood savings) and costs (price, electricity bill increase, risk of electric shock) of the two ICS choices. Households watched as the teams performed demonstrations and made tea on the ICS. Purchase was not compulsory, and sales teams explained the payment options before purchase: pay in full upfront, or in three interest-free installments at later visits.

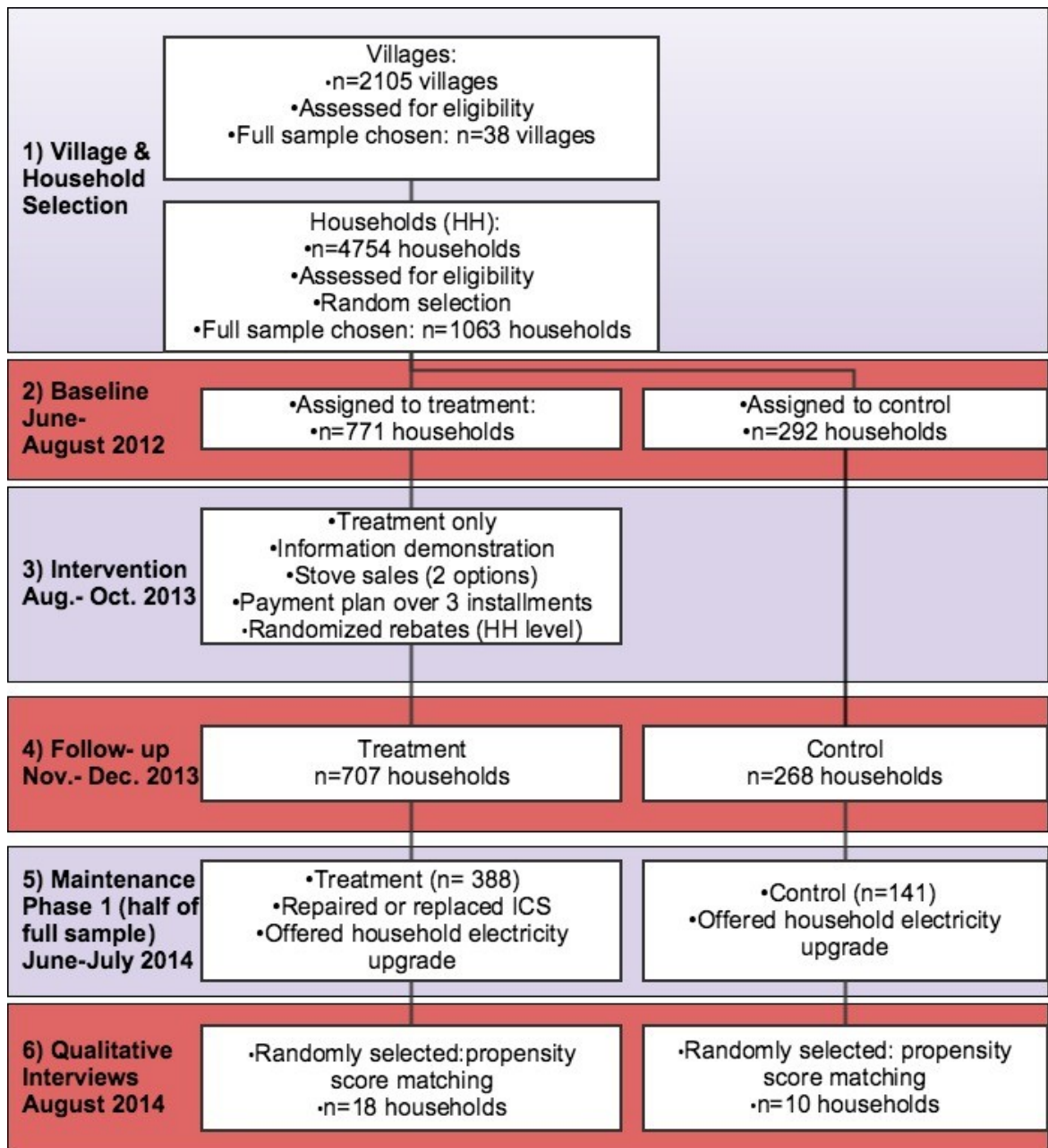


Figure 3: Study Design and Timeline (Sections in red indicate periods of data collection, the methods for which are outlined in detail below)



**Figure 4: G-coil Electric Stove (Photographed during fieldwork, 2014)**



**Figure 5: Greenway Smart Stove (Photographed during fieldwork, 2014)**

Of the treatment households targeted by the intervention, 51% chose to purchase at least one of the two stoves. The G-coil stove was purchased by 40% of households and 16% purchased the Greenway natural draft biomass stove, with some homes purchasing one of each. Traditional *chullah* ownership remained unchanged and though frequency of use decreased, all households did continue to use their *chullah*.

## **2.3 Maintenance Visits**

Approximately six months after completion of the post-intervention follow-up survey (described in detail in section 2.4.1) enumerator teams conducted stove maintenance visits to half of the households (a random mix of treatment and control, with the other half to be done at a later time) accompanied by a local electrician (Figure 3, section 5). An abbreviated survey was used to track stove use and ensure that all stoves were functioning properly. The team examined every intervention ICS and repaired or replaced stoves when necessary.

As part of the maintenance visits, treatment and control households had the opportunity to pay for up to two electrical upgrades in their home. The upgrades included (1) switch, socket, or frame replacements which involved building a new switch board or attaching an existing switch board to the wall; (2) wire replacement for burnt, melted, or incomplete wiring, and/or; (3) installation of a mini circuit breaker. During this phase, households were also given a demonstration, a pamphlet on stove maintenance and cleaning and advised of the importance of taking care of the stove.

## **2.4 Measures**

To understand how households in rural Uttarakhand used and viewed their stoves, data collection consisted of three different interactions with households: (a) a baseline household survey pre-intervention from August-October 2012, (b) a follow-up household survey post-intervention in December 2013 and (c) semi-structured interviews with primary cooks living in the same communities selected previously (Figure 3). All field personnel employed for the household surveys participated in a four-day training using

lectures, role-playing, and field trials. At baseline, team supervisors attended several days of additional training to learn random household selection, use of the GPS and drawing of village maps; these supervisors were also instructed about proper communication with field teams prior to initiating both surveys. The qualitative interview assistant participated in a two-day training including introduction to the interview guide, instruction on proper interviewing and probing techniques as well as field trials and pilot interviews.

#### **2.4.1 Measure 1: Quantitative Data Collection**

The sampling frame consisted of 97 different communities within 38 different *Gram Panchayats* (villages). The overall sample was stratified based on prior exposure to our NGO partner: half of the sample had prior exposure and the other half did not. The final sample was a mix of treatment (n=771) and control (n=292). The treatment households received the aforementioned intervention and stove sales campaign, and the control households did not. All sample households were visited during baseline, follow-up, and maintenance surveys (outlined in Figure 3). Households were randomly selected within the 38 villages according to village size (i.e. in smaller villages less homes were chosen, in larger villages more). The teams visited every n<sup>th</sup> house in the village ensuring that households were varied and collected across the extent of the village. If a randomly selected household was not available or refused to participate during the baseline survey, a neighboring home was randomly selected as replacement. The final sample consisted of 1063 households. A total of 2,038 surveys (each home was visited two times for one baseline and one follow-up survey) were conducted at baseline and follow-up.

The baseline survey (Appendix B) was conducted among both treatment and control households prior to finalizing the study design and implementing the intervention. In this survey, we collected detailed information on household demographics, stove and fuel use, cooking practices, and socio-economic characteristics. The survey contained questions on whether households owned one of eleven types of stoves, how many burners the stoves had, how often they were used, and where they were situated on the property. Additionally, information regarding fuel use was collected, including how regularly fuels were obtained and used how much money is spent on fuel per month. The survey instrument was designed and updated with the assistance of the local NGO partner, incorporating lessons learned from focus group discussions with local community members and pretesting. The final instrument consisted of a household questionnaire, fuel weighing (over a 24-hour period to monitor fuel consumption) and a community survey (administered to one community member in each village). All of these data were self-reported with the exception of the fuel-weighing exercise, in which field teams measured the weight of fuelwood used by households before and after a 24-hour period.

Follow-up surveys for measurement and analysis of intervention impacts and stove use were conducted in the winter of 2013 (Appendix C). Enumerator teams were again trained and deployed into both treatment and control villages. The final instrument content overlapped approximately 95% with the baseline survey in order to measure the same behaviors, attitudes and outcomes and document changes that occurred from the baseline in 2012 to this endline in December 2013.

## 2.4.2 Measure 2: Qualitative Data Collection

In the summer of 2014, approximately one month after the final quantitative survey (maintenance) was conducted, one interviewer and one researcher visited thirty-three randomly selected households. A total of twenty-eight interviews with primary cooks in eleven villages were conducted.

Households were randomized to generate a sample for qualitative individual interviews. To create a random sample from the larger group of households, propensity score matching of treatment and control households was performed using results from baseline data (presented in Bhojvaid et al., 2014). In step one of this approach, we fit a multivariable logistic model for the outcome of ICS purchase using variables most likely to influence ICS adoption including:

- whether the household owns a toilet
- education level of the head of household
- education level of the primary cook
- whether the household is female-headed
- the age of the head of household
- how many rooms the home has
- whether the survey respondent thinks stoves with less smoke have a medium or greater impact on health
- if the household has access to credit and has used it in the past year (measured using questions that asked if the household has taken a loan in the past year from family or friends, a microfinance in group, a money lender, employer, landlord, or commercial bank)
- if the household has access to savings and has used it in the past year (measured using questions that asked if household could put money in a commercialized bank or other microfinance institution)
- if the household is risk averse (measured using questions that asked households to choose whether they would accept a small sum of hypothetical money then, or flip a coin for double or nothing)
- if the household is patient (measured using questions that asked households in a hypothetical situation if they wanted to receive a sum of

- money tomorrow, or a slightly larger sum after twelve months)
- whether the household is located in a village where the project's NGO partner works.

After matching, balance checks were conducted to ensure that randomly selected households were matched effectively on the variables listed above. When p-values were less than 0.1, treatment and matched control households were considered different and a new match was selected to ensure household pairs were better balanced.

The interviews focused on three domains: 1) perceived positive and negative attributes of ICS and traditional *chullahs*; 2) perceptions of and health changes from use of ICS and 3) knowledge of local diseases and health in relation to cooking practices. All questions in the interview guide (Appendix D) were pretested by locals employed at the NGO and in four different village households with local men and women to ensure cultural meaning, local dialect, and comprehension. Based on these pretests, the interview guide was updated before deployment in the larger sample.

## **2.5 Procedures**

### **2.5.1 Quantitative Data Collection Procedures**

Participation in household surveys was voluntary; upon arrival in a village, the randomly chosen households were approached by the research team and asked to participate in a short survey. Trained enumerators conducted all household surveys in the local languages of Hindi and Kumaoni (most locals mix the two when speaking). A statement introducing the research project, the aims of the study, possible benefits and drawbacks, and the participants' rights was read at the beginning of each survey,

informing participants of the voluntary nature of the research. Each respondent verbally gave approval or declined participation.

## **2.5.2 Qualitative Data Collection Procedures**

As with the quantitative survey, qualitative interview participants resided in either the treatment or control villages and had already participated in both quantitative surveys. One trained research assistant conducted all qualitative interviews in the local languages of Hindi and Kumaoni, accompanied by the researcher. A statement informing participants of their rights and consent was given at the beginning of each interview.

The primary cook was the preferred interviewee; in the three cases where he or she was not home or was unwilling, the head of household was interviewed. Only one individual per household was interviewed, though in some cases more than one individual was present for the discussion. All interviews lasted between thirty and ninety minutes. Interviews were recorded when consent was given. Notes in the local language were handwritten during each interview by the interviewer; the researcher also took notes in English.

As it is not customary in this region to provide compensation for participation, no remuneration was provided to participants for the household survey or for the individual interview. Upon conclusion of both the survey and interview, the participants were asked if they had any questions regarding the purposes of research, or if anything was not discussed that they thought important. All enquiries were answered by the research team on site and brought to the attention of the NGO partner when necessary.

Both the household surveys and the qualitative interviews were approved by the Duke University Institutional Review Board, which granted ethical approval for the research.

## **2.6 Analysis**

### **2.6.1 Quantitative Data Entry**

After collection, the data were compiled into organizational and analytical software programs. The baseline and endline household surveys were entered from the paper copies into CS Pro, from which they were imported into the statistical analysis program STATA/SE 13.1. Both sets of data were cleaned before beginning analysis.

### **2.6.2 Qualitative Data Entry**

Using recordings and field notes, interview discussions were transcribed verbatim from Hindi and Kumaoni into English and directly entered into Microsoft Word. To ensure that the responses were given the emotion and tone they were spoken in, there were multiple stages of translation: preliminary translation, evaluation of the first translation, and an assessment of cross-language similarities. When discrepancies arose, a back translation was employed using a native speaker who was not present at the interview, which provided for the most authentic translations for data analysis. Following transcription, the interviews were entered from Microsoft Word into the qualitative analysis software program, NVIVO 10.1.3 for Mac.

### **2.6.3 Quantitative Analysis**

To examine the impact of the intervention on perceptions of ICS, we used survey

questions regarding perceptions of traditional and improved stoves and health.

Multivariable logistic regression models were used to assess the association of certain personal and contextual factors with outcome variables at baseline and endline. Based on statistical significance of coefficients, we drew conclusions about the effect of the intervention and outlined important perceptions to consider in future interventions and stove designs.

Key outcomes including best and worst attributes of both ICS and traditional *chullahs*, as well as respondent perceptions of smoke and ICS impact on health were analyzed against household characteristics (Table 1). The model used in all regressions varies only in the outcome variables:

$$Y_i = \beta_0 + \beta_1 x_i + \varepsilon_i$$

In these models,  $Y_i$  refers to different perceptions outcome variables for household  $i$  (e.g., perception that smoke is unsafe or that cost is the best attribute of a traditional stove; see Table 1 for the full set of such outcomes), and  $\beta_1 x_i$  is a household vector of covariates (e.g., household size, relative wealth; again see Table 1 for the complete list) that remains the same across outcomes, for a household  $i$ . All models, except baseline ICS attributes (as households had not yet purchased ICS at baseline), were run twice, once using baseline responses and again using follow-up responses. The odds ratios (OR) and p-values were assessed from each model, illustrating the relative strength of associations and the statistical significance of the relationships.

**Table 1: Multivariable Logistic Models and Covariates**

Model	Outcome	Covariates
1	Perception: Smoke is unsafe for health	<ul style="list-style-type: none"> <li>• Use of intervention stove in last two weeks</li> <li>• Household (HH) owns toilet</li> <li>• HH size</li> <li>• HH takes risks</li> <li>• HH is patient</li> <li>• Relative wealth of HH</li> <li>• Respondent has not received education</li> <li>• Respondent level of education</li> <li>• Respondent age</li> <li>• HH resides in NGO village</li> <li>• HH has access to credit</li> <li>• HH has access to savings</li> <li>• Female respondent</li> <li>• HH received treatment</li> </ul>
Traditional Stove		
2	Smoke as worst traditional stove attribute	
3	Cost as best traditional stove attribute	
4	Taste as best traditional stove attribute	
5	Cleaning requirement as worst traditional stove attribute	
Improved Stoves		
6	Fuel cost/electricity bill as worst ICS attribute	
7	Fuel type as best ICS attribute	
8	Speed of cooking as best ICS attribute	

#### 2.6.4 Qualitative Analysis

Qualitative analysis began with reading and re-reading of the text in NVIVO 10.1.3 for Mac to become familiar with the data. Using applied thematic analysis<sup>2</sup> to interpret qualitative data, key themes in the text were identified using codes, following which overarching themes describing these codes and relationships were outlined. Word searches, frequency queries, and data matrices further aided in data reduction. In addition to emerging themes and codes, specific quotes representative of the aims were identified.

Quantitative and qualitative data were analyzed separately and compared once analysis was complete.

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<sup>2</sup> Described in Guest et al. (2011)

## 3. Results

### 3.1 Quantitative Results

Descriptive statistics for the sample are described in Table 2 below. With the exception of the intervention stove (G-coil, Greenway) statistics, all descriptive statistics are from baseline survey data. The majority of respondents were the female primary cooks (83%). The remaining 17% of respondents were both the head of household and primary cook, though sometimes only the head of household. The average household size in the sample was 5.2 people. Overall, 72% of households were in the open/general caste category, 24% were scheduled caste.<sup>1</sup> Fifty-five percent of the population was below the poverty line (BPL)<sup>2</sup>, 37% were above the poverty line; 9% do not know or refused to answer; this was measured with the household's government-issued BPL card. Ninety-percent of households had an electricity connection, either sporadic or constant. The median number of hours of electricity availability per day was about 18 hours. Households were primarily agricultural and 79% farmed their own land.

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<sup>1</sup> The caste system in India is a social system delineating individuals of the same rank, occupation, and heredity according to certain customs. Scheduled caste populations are historically disadvantaged and geographically and socially isolated groups that often have low socio-economic and educational status recognized by the Constitution of India (Government of India, 2015).

<sup>2</sup> "Below poverty line" is a benchmark defined by the Indian government to indicate economic disadvantage, indicating which households are in need of government aid. Determination of BPL households varies across state and regional lines.

**Table 2: Quantitative Sample Household Characteristics**

<b>Household (HH) Characteristics</b>	<b>Treatment</b>		<b>Control</b>		<b>Total Sample</b>	
	<b>n</b>	<b>Freq. (%)</b>	<b>n</b>	<b>Freq. (%)</b>	<b>n</b>	<b>Freq. (%)</b>
HH Education	746	5.3	280	5.1	1026	5.2
HH Size	762	4.8	289	4.9	1051	4.9
Age of Head of HH	771	53.4	292	52.6	1063	53
Children <5yrs age	762	0.4	289	0.54	1051	0.5
BPL	771	415 (53.8)	292	165 (56.5)	1063	580 (54.6)
Electricity connection	771	683 (88.6)	292	270 (92.5)	1063	953 (89.7)
Female-headed	771	188 (24.4)	292	92 (31.5)	1063	280 (26.3)
HH has a toilet	771	642 (83.3)	292	255 (88.2)	1063	897 (91.3)
General Caste	771	555 (72.0)	292	205 (70.2)	1063	760 (71.5)
Scheduled Caste	771	192 (24.9)	292	66 (22.6)	1063	258 (24.3)
<b>Stove Ownership</b>						
Chullah	771	745 (96.7)	292	277 (94.9)	1063	1022 (96.1)
LPG	762	278 (36.5)	289	77 (26.6)	1051	355 (33.8)
Biogas	762	6 (0.8)	289	1 (0.3)	1051	7 (0.6)
G-coil	762	298 (39.1)	---	---	762	298 (39.1)
Greenway	762	114 (15.4)	---	---	762	114 (15.4)
G-coil and Greenway	762	39 (5.1)	---	---	762	39 (5.1)

According to the respondents at baseline, the three best aspects of the traditional *chullah* were the taste of the food (90%), the cost of the stove (55%), and the ability to cook all foods (7%). The worst features identified by respondents were the amount of smoke that is produced (63%), the cleaning requirements (45%) and the amount of fuel needed for the stove (22%). As many households had not yet learned of ICS, the ICS attributes section in the baseline had a low response rate, and were dispersed across a number of responses. The best features were portability (1.6%, 17 of 1063 responses) the amount of smoke produced (1.5%, 16 responses) and the amount of fuel needed (0.28%,

3 responses). The worst attributes of ICS were cost (1.7%, 18 responses), fuel type (0.47%, 5 responses), and amount of heat produced (5 responses).

Using follow-up survey responses, the best and worst attributes of ICS drastically changed post-intervention. The most common best features of ICS were the fact that it cooks all foods (22%), the fuel type required (16%) and the speed of cooking (10%). The worst attributes changed to the amount of smoke produced (32%), that it requires electricity (16%), and the cost of fuel (1%). Responses varied in the follow-up, with no one response representing an overwhelming majority.

Regression results indicate changing perceptions of attributes of ICS between baseline and post-intervention, while traditional stove perceptions generally remained constant. The effect of treatment can be seen in the results of many of the follow-up survey models, though the direction and strength of the relationship varies.

### **3.1.1 Perceptions of Smoke and Health**

In the follow-up, households that received the treatment were 65% less likely to say that smoke was unsafe (Table 3). Household access to savings was positively associated in the baseline survey with households believing smoke was unsafe for their health, while in the follow-up model it was no longer significant. The relative wealth of the family was initially positively associated with the outcome, but became negative post-intervention. Credit became a significant predictor of the outcome post-intervention, though negatively associated, with households 60% less likely to choose that smoke was unsafe if they had access to credit.

In model 2, at baseline, smoke was the worst factor of a traditional stove, and female respondents were more likely to choose smoke as a negative factor. In the follow-up survey, homes with access to a toilet were more likely to identify smoke as a worst attribute. Similarly, homes that had used an intervention stove in the past two weeks were 66% less likely to choose smoke as the worst attribute of the traditional stove.

**Table 3: Models 1 and 2: Smoke Perceptions**

<i>Outcome</i>	<i>Model 1: Smoke is unsafe for health</i>				<i>Model 2: Smoke is worst attribute of traditional stove</i>			
	<i>Baseline (n=887)</i>		<i>Follow-up (n=888)</i>		<i>Baseline (n=887)</i>		<i>Follow-up (n=893)</i>	
	<i>OR</i>	<i>p-value</i>	<i>OR</i>	<i>p-value</i>	<i>OR</i>	<i>p-value</i>	<i>OR</i>	<i>p-value</i>
Intervention stove used- last 2 weeks	1.00	---	0.79	0.18	1.00	---	0	0.02*
HH has access to a toilet	1.12	0.58	0.80	0.68	0.66	0.05*	1.27	0.62
HH size	1.05	0.18	1.00	0.99	1.06	0.12	1.07	0.05*
HH takes risk	1.28	0.17	0.76	0.12	0.89	0.53	0.82	0.26
HH is patient	0.65	0.18	1.05	0.80	0.81	0.26	0.91	0.59
Relative wealth	1.19	0.05*	0.73	<0.001*	1.47	<0.001*	1.10	0.19
HH resides in NGO village	0.80	0.13	0.90	0.46	0.79	0.11	0.80	0.13
Treatment	1.29	0.11	0.65	0.01*	0.86	0.36	1.02	0.91
Access to credit	1.30	0.18	0.60	0.01*	1.44	0.08*	0.96	0.83
Access to savings	2.64	<0.001*	0.62	<0.001*	1.03	0.86	0.93	0.67
Female respondent	0.82	0.39	0.95	0.79	1.70	0.04*	0.77	0.19
Education level of respondent	1.00	0.93	0.98	0.55	1.04	0.20	0.99	0.62
Respondent has not received education	0.86	0.59	0.71	0.20	1.16	0.60	0.84	0.53
Respondent age	1.01	0.14	1.00	0.86	1.00	0.42	1.00	0.60

(\* denotes significance at <0.1 level; clustered at the community or hamlet level as this is the administrative level at which the stove promotion campaign was assigned)

### **3.1.2 Traditional Stove Attributes**

A number of household characteristics are significantly associated with the most commonly mentioned best attributes of traditional cookstoves at baseline, providing insight into types of households that value cost, taste, and the number of dishes the traditional stove can cook (Table 4). For example, households that chose cost as the best attribute of a traditional stove (model 3) were more likely to have access to savings, and likely to take more risks. In the follow-up, households were 7% more likely to choose cost as the best feature of the traditional stove if they resided in a village where the NGO presently worked. Relative wealth was not a significant predictor of respondents mentioning the cost of the stove.

Model 4 results show that at baseline wealthier households and access to savings were significantly associated with households choosing taste of food as a best attribute. In the follow-up, respondents with no education were more likely to choose this attribute as the best.

In model 5, both baseline and follow-up results show treatment households were significantly more likely to choose cleaning requirement as the worst attribute of the traditional stove. Whether the respondent was female was also statistically significant, an expected outcome since women are most often the one's cleaning and repairing mud stoves.

**Table 4: Models 3, 4 & 5: Traditional Stove Attributes**

<i>Outcome</i>	<i>Model 3: Cost as best attribute of traditional stove</i>				<i>Model 4: Taste as best attribute of traditional stove</i>				<i>Model 5: Cleaning Requirement as worst attribute of traditional stove</i>			
	<i>Baseline (n=887)</i>		<i>Follow-up (n=893)</i>		<i>Baseline (n=887)</i>		<i>Follow-up (n=893)</i>		<i>Baseline (n=887)</i>		<i>Follow-up (n=893)</i>	
	<i>OR</i>	<i>p-value</i>	<i>OR</i>	<i>p-value</i>	<i>OR</i>	<i>p-value</i>	<i>OR</i>	<i>p-value</i>	<i>OR</i>	<i>p-value</i>	<i>OR</i>	<i>p-value</i>
Intervention stove used- last 2 weeks	1.00	---	0.59	<0.001*	1.00	---	1.00	0.99	1.00	---	1.15	0.44
HH has access to a toilet	0.82	0.33	1.08	0.88	1.05	0.80	0.38	0.05*	1.14	0.51	0.29	0.02*
HH size	1.04	0.23	1.01	0.72	0.95	0.18	0.98	0.55	0.97	0.37	0.97	0.35
HH takes risk	1.63	0.01*	1.39	0.06*	0.73	0.09*	1.21	0.34	1.02	0.89	0.92	0.65
HH is patient	0.50	<0.001*	0.50	<0.001*	2.07	<0.001*	0.94	0.77	1.43	0.04*	1.35	0.08*
Relative wealth	0.87	0.13	0.99	0.93	1.27	0.01*	1.16	0.07*	0.99	0.94	0.96	0.58
HH resides in NGO village	0.98	0.90	1.07	0.65	0.87	0.34	1.13	0.44	0.92	0.55	0.99	0.95
Treatment	1.00	1.00	1.30	0.12	0.99	0.95	0.98	0.90	1.59	<0.001*	1.51	0.01*
Access to credit	0.90	0.57	1.38	0.10*	1.20	0.34	1.23	0.32	0.85	0.41	0.74	0.13
Access to savings	1.90	<0.010*	0.71	0.03*	0.49	<0.001*	1.08	0.66	2.45	0.00*	1.31	0.09*
Female respondent	1.06	0.81	0.78	0.22	1.30	0.27	0.73	0.20	0.84	0.46	1.46	0.06*
Education level of respondent	0.99	0.85	0.98	0.40	0.96	0.19	1.05	0.12	0.98	0.57	1.01	0.86
Respondent has not received education	0.98	0.95	0.78	0.34	0.84	0.54	1.65	0.10*	0.84	0.53	1.01	0.97
Respondent age	0.99	0.10*	1.00	0.34	1.01	0.27	1.00	0.89	0.99	0.14	0.99	0.12

(\* denotes significance at <0.1 level; clustered at the community or hamlet level as this is the administrative level at which the stove promotion campaign was assigned)

### 3.1.3 Improved Stove Attributes

Without stratifying for the two or more different types of ICS,<sup>3</sup> the results at baseline and follow-up are strikingly different. Because of the few responses in the baseline for ICS perceptions questions, models were run only for the follow-up survey data.<sup>4</sup> The most common results for best and worst attributes from the baseline are shown in Table 5. These results differed from the most frequently mentioned features post-intervention (Table 6).

There is one commonality between the attribute “smoke produced by the stove.” This feature was a *best* quality of ICS in the baseline, and a *worst* quality of ICS post-intervention. Of those who chose “smoke produced” as the worst attribute post-intervention, 63 purchased the Greenway, and 152 purchased a G-coil.

**Table 5: Baseline ICS Attribute Responses**

Worst Attributes	Frequency	N	Best Attributes	Frequency	N
Cost	18	1051	Portability	17	1063
Fuel type	5	1051	Smoke Produced	16	1063
Stove gives off Heat	5	1051	Amount of fuel	3	1063

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<sup>3</sup> Respondents could have been thinking of either of the two intervention stoves, LPG, or other types when answering the ICS questions.

<sup>4</sup> Few households had heard of an ICS pre-intervention and therefore did not answer the questions regarding their perceptions of ICS.

**Table 6: Follow-up ICS Attribute Responses**

Worst Attributes	Frequency	N	Best Attributes	Frequency	N
Smoke Produced	339	1051	Ability to cook all foods	234	1051
Uses Electricity	163	1051	Fuel type	166	1051
Fuel	50	1051	Speed of cooking	110	1051
Cost/Electricity Bill					

In model 6, those in the treatment group had six times greater odds (OR 6.26) of responding that a negative feature of the ICS was the cost of fuel or electricity bill associated with the stove (Table 7). The household's relative wealth was negatively associated with this outcome as well. Similarly, households that had used an intervention stove in the past two weeks were almost three times more likely to respond that fuel cost/electricity bill was the worst ICS attribute. Conversely, fuel type was listed as one of the most common *best* features (model 7), illustrating a clear divide among those who responded to these questions (Table 7). Access to savings and relative wealth of households were also significant in model 7, and treatment households were five times more likely to choose fuel type as the best attribute.

In model 8, speed of cooking as a best attribute of ICS was significantly positively associated with whether the respondent had used their intervention stove in the past two weeks, as well as the age of respondent (Table 7).

**Table 7: Models 6, 7 & 8: ICS Attributes**

<i>Outcome</i>	<i>Model 6: Fuel cost/electricity bill as worst attribute of ICS</i>		<i>Model 7: Fuel type as best attribute of ICS</i>		<i>Model 8: Speed of cooking as best attribute of ICS</i>	
	<i>Follow-up (n=893)</i>		<i>Follow-up (n=875)</i>		<i>Follow-up (n=875)</i>	
	<i>OR</i>	<i>p-value</i>	<i>OR</i>	<i>p-value</i>	<i>OR</i>	<i>p-value</i>
Intervention stove used- last 2 weeks	2.71	<0.001*	0.87	0.54	1.72	0.03*
HH has access to a toilet	0.73	0.77	0.34	0.06*	1.00	---
HH size	1.09	0.29	1.05	0.34	1.07	0.16
HH takes risk	1.76	0.17	0.94	0.79	1.22	0.49
HH is patient	0.89	0.78	0.92	0.73	0.94	0.84
Relative wealth	0.73	0.09*	1.48	<0.001*	1.13	0.31
HH resides in NGO village	1.53	0.21	2.13	<0.001*	0.96	0.85
Treatment	6.26	0.02*	5.33	<0.001*	4.92	<0.001*
Access to credit	0.53	0.21	0.72	0.23	1.78	0.03*
Access to savings	0.39	0.05*	1.57	0.03*	0.71	0.21
Female respondent	0.93	0.90	1.16	0.61	1.13	0.71
Education level of respondent	1.08	0.23	0.96	0.32	1.01	0.86
Respondent has not received education	1.24	0.74	0.96	0.91	1.07	0.88
Respondent age	1.00	0.73	0.98	<0.001*	1.02	0.04*

(\* denotes significance at <0.1 level; clustered at the community or hamlet level as this is the administrative level at which the stove promotion campaign was assigned)

### **3.1.4 Post Follow-up Usage**

The maintenance survey conducted in July 2014 (post follow-up) offers more recent ICS usage figures. Only half of households were visited for phase one of maintenance (as of February 2015), 166 of those homes purchased an ICS. Of the 166, 16 homes no longer owned the stove, 12 of which had given it as a gift. Of the remaining ICS, 54 were in need of repairs, of which two were fully replaced. When asked how often they used their ICS before it broke (if applicable) 36 said once a week and 11 reported twice a week, while three people said 3 times and 3 people 4 times a week. When asked how often they use it presently (broken or not), 45 responded once a week, 15 use it twice a week, and four use it three times a week. Nine people said they use the ICS four times a week.

### **3.2 Qualitative Results**

In the smaller interview sample, the households that purchased an ICS had owned it for between nine and twelve months. Among the 28 (of 33 approached) households who agreed to participate in the interview, the average age of respondents was 38.6 years. Seventy-seven percent of the respondents were female, five of them heads of household (Table 8). Sixty-four percent were treatment households (n=18), of which 72% (n=13) had chosen to purchase one or both of the ICS during the intervention. Ten (56%) chose the G-coil electric stove and three (17%) purchased a Greenway. Across all eleven villages, every respondent that participated in the interview owned and used a traditional *chullah*. Of all sample households, 43% owned a liquefied petroleum gas (LPG) stove.

Only one home had a biogas tank<sup>5</sup> (which stores cow manure and produces methane as fuel). This same household is the only household in the smaller sample that purchased both a Greenway and a G-coil.

The average years of education of the head of household among the sample is 5.3 years, and 5.4 years for the primary cook (this is combined in Table 8 for average household education). The average household size is 5.9 people. Most households had no children in the home under the age of five at the time of visit (19 of 28). All households had an electricity connection, though some reported intermittent service and connectivity.<sup>6</sup> Of the 28 households, 68% (n=19) reported they were below the poverty line.

**Table 8: Qualitative Sample Household Characteristics**

<i>Characteristics of Households (HH)</i>	<i>Treatment (n=18) n (%)</i>	<i>Control (n=10) n (%)</i>	<i>Total Sample (n=28) n (%)</i>
Mean HH Education (yrs.)	5.3	6.9	5.8
Mean HH Size	6.0	5.6	5.9
Mean Number of Children <5yrs. age	0.6	0.5	0.6
BPL	14 (77.8)	5 (50)	19 (67.9)
Electricity	18(100)	10 (100)	28 (100)
Female-headed	3 (16.6)	2 (20)	5 (17.9)
G-coil	10 (55.6)	0	10 (35.7)
Greenway	3 (16.6)	0	3 (10.7)
Chullah	18 (100)	10 (100)	28 (100)
LPG	9 (50)	3 (30)	12 (42.8)
Biogas	1 (5.5)	0	1 (3.6)

<sup>5</sup> However, the tank had fallen into disrepair and the household had not used it in over eight years.

<sup>6</sup> This was for a varying range of reasons including poor household connection, poor village level connectivity, sharing with a neighbor, etc.

### 3.2.1 Impressions of ICS and *Chullahs*

All households used their traditional stove for the same few activities: heating the home, making food (lentils, vegetables, rice etc.) and *chai* (tea) and occasionally to produce smoke for mosquito control (Table 9). All participants reported that they were satisfied with the *chullah* to cook for large families and prepare traditional meals. Participants agreed that because it was a method their ancestors, grandparents, and parents had been using, cooking with a *chullah* was a suitable way of life that did not need changing. One primary cook noted, “Since our ancestors we have been using it. They were cooking on it and we are still using it” (R11). Many of the primary cooks commented on the taste of the food as a large factor for continued use of the *chullah*. “The taste is good,” one respondent noted, “it is different than all these new stoves...we like the food from this” (R9).

Many of the homes also had an LPG gas stove in addition to their *chullah* and used it frequently. One control household noted that they used the gas stove when wood was wet from the monsoon and to save wood, and the wood stove to save gas, ultimately concluding they use them equally.

Among treatment households, the primary cooks noted cost as the largest barrier to adoption of an ICS, with one commenting, “we have a problem most of the time, we are poor, and they said that you will have to give 700 rupees...it was costly for us” (R12). Women also expressed disappointment that they were not home during the sales visit; either only their husband was home and chose not to purchase the stove or the home was empty.

Conversely, the general impetus for purchase of the ICS was the sales teams' advertising that it cooked faster than the *chullah* and would save households substantial amounts of wood. One respondent noted:

I wanted to reduce my dependency on wood for the environment, I will cut more trees for the other [*chullah*] stove, and it will affect environment more so this one uses less wood (R13).

All households that purchased an electric stove reported using the stove to cook food occasionally, but only for instant soup or vegetables. While some used it daily for making *chai* and boiling milk and water, others cited fear of electrical shock and an increased electricity bill as reasons for disuse. Three of the ten G-coil stoves were in need of repair for either frayed wires or burnt/melted outlet plugs; our team subsequently fixed these.<sup>7</sup>

Almost half of the G-coil owners commented that because their home has a chimney, they have less need for an ICS. The G-coil stove is never used among households in the sample to make the local bread, *chapatti*, which requires a flame. This was a common complaint among all electric stove owners; as a result, stove stacking is common among all G-coil-owning households. Households also said that they use the G-coil because of the time it saves.

We just save time. If I am cooking two things then I keep something in G-coil as well, which cooks quicker. That's the change. If we have to cook rice and lentils quickly, then we just keep it on that, it cooks the food very quickly. (R10).

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<sup>7</sup> It is important to note that some responses regarding use and experiences with the stove may have differed if their stove had already been fixed by the time of interview.

Three of the treatment households purchased and still own a Greenway stove.<sup>8</sup> Of the three, one uses gas exclusively now, which she acquired four months before our arrival (after purchasing the Greenway). Prior to purchase of the gas stove, she used to make “everything” on the Greenway. As a single woman with her children gone, she only cooks for one. Another household of eight uses the Greenway outside to boil water. “We have not cooked food on it yet” (R1) she noted laughing, while the third household also uses it for only boiling water. The consensus among the three was that it lights much faster than the traditional *chullah*. “In this [*chullah*] I have to blow air. It takes time. The Greenway was quick” (R2).

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<sup>8</sup> Two other Greenway owners were not available for interviews; one declined participation and another was not available at two different attempts for interviews.

**Table 9: Comparison of Use, Benefits, and Problems of Three Stoves**

Stove	Reasons for use	Benefits	Problems
Traditional <i>Chullah</i>	<ul style="list-style-type: none"> <li>• Is customary</li> <li>• Locally available/buildable</li> <li>• Amount of dishes that can be cooked at once</li> </ul>	<ul style="list-style-type: none"> <li>• Supports large vessels</li> <li>• Taste of food</li> <li>• Heats home</li> <li>• With a chimney, ventilation</li> </ul>	<ul style="list-style-type: none"> <li>• Excessive smoke</li> <li>• Eye irritation</li> <li>• Distance for wood</li> <li>• Hot in summers</li> <li>• Doesn't light when wood is wet</li> <li>• Cleaning requirement</li> </ul>
Greenway Smart Burning	<ul style="list-style-type: none"> <li>• Requires less space</li> <li>• Supplementary stove (for guests)</li> </ul>	<ul style="list-style-type: none"> <li>• Cooks and lights fast</li> <li>• Uses less wood</li> <li>• Less smoke</li> <li>• Portable</li> </ul>	<ul style="list-style-type: none"> <li>• Need to cut fuel small</li> <li>• Difficult to remove coal/ash</li> <li>• Too much smoke for inside use</li> </ul>
G-coil Electric	<ul style="list-style-type: none"> <li>• Wood saved</li> <li>• Time saved</li> <li>• Supplementary stove (for guests)</li> <li>• Requires less space</li> </ul>	<ul style="list-style-type: none"> <li>• Cooks fast</li> <li>• No smoke</li> <li>• Keeps utensils/vessels clean</li> <li>• Is aesthetic</li> <li>• Portable</li> </ul>	<ul style="list-style-type: none"> <li>• Cannot make <i>chapatti</i></li> <li>• Increased electricity bill</li> <li>• Fear of electrical shock</li> <li>• Maintenance required</li> <li>• No stand</li> <li>• Doesn't heat kitchen/home</li> <li>• Electricity fluctuation</li> </ul>

Another common theme among treatment respondents was the design of both ICS. Many women expressed frustration with the design of the Greenway, conveying irritation that the wood needs to be cut very small before inserting into the stove.

The reason we are not able to cook food on it is just because we have to put wood on again and again. *[Laughing]* Thick wood cannot go inside, we have to put thin wood. One person has to sit in front of it to keep it burning. Otherwise the stove is good. The flame is concentrated. But the wood needed is very thin. (R7)

Forty percent of G-coil-owning households cited lack of a stand above the coil as one aspect they would like to change or add to the stove. Vessels burning when placed directly on the coil were a common complaint, so a stand to separate vessel from coil

would lessen the problem. Absence of a stand on the G-coil was not an option in the attribute and preferences sections on the quantitative surveys.

The high costs of fuel, measured in time hiking to obtain wood or the electricity bill, was a common theme among all participants. Both treatment and control individuals complained of the need to hike for wood, a task that is growing in difficulty and time required. Respondents expressed annoyance about walking further and further for wood, sometimes spending two full days every week hiking in the forests. The electricity bill was a major complaint among G-coil owners, with many noting that although they were warned of an increase, they did not think it would be so high. One participant explained, “We are afraid of [the] electricity bill; we are poor people, we cannot afford if the electricity bill rises” (R8).

### **3.2.2 Knowledge of Effects of Cooking Practices on Health**

The interviews served as a window into the participants’ perceptions of health effects from stoves. Most of the treatment households responded that the traditional stove has a negative impact on their health; two said there was no impact, and one mentioned it was good for health by providing heat in the winters. When respondents discussed the topic of ICS health benefits, more than half of the entire sample said there is no impact from using an ICS. Fifty-five percent of the treatment group were among those who claimed no impact from ICS use. Some said that the decreased amount of smoke coming from the stove was a positive health effect, “In health, the changes are that the smoke is produced less now” (R4).

The majority of treatment and control households noted eye irritation as a negative impact from *chullah* use; seventy-percent of all control households complained of tearing and irritated eyes in smoky kitchens. “Smoke from it [*chullah*] causes irritation in eyes” one participant responded, while another commented, “my eyes are always irritated, tears fall down” (R5, R6). Despite this, more than half of the primary cooks in both treatment and control, when asked later to describe what they do not like about their traditional *chullah*, couldn’t answer the question and contemplated before responding “nothing.” While many noted that the eye irritation and smoke from their *chullah* is a drawback of using the stove, both treatment and control individuals referred to it as inevitable, something that one grows accustomed to and is a part of everyday life. This inconvenience was associated with other routine troubles, such as rainy weather in the monsoon season. Thus while it is a bother to suffer from cough and cold in this region, the respondents see it as a necessity.

Everybody suffers from cold and cough at least once a year. It should occur once a year... there should be running nose...the cough is not cured until it comes out of your body, then you are treated (R3).

All three Greenway owners discussed lessened smoke levels, but still too much for use inside the home. “It produces a lot of smoke...so it’s a problem to keep it inside. There is no profit in that” (R1). They did mention, however, that “the effect [of use] is less smoke and less coughing” (R2).

A small number of G-coil owners expressed fear of electric shocks when commenting on health effects of ICS. These households had experienced electric shock

from the G-coil previously, thus worrying them about future use.

### **3.2.3 Knowledge of Local Health, Diseases and Prevention**

Household instances of cough, wheeze, running nose, eye irritations and other respiratory infections did not drastically increase or decrease among all qualitative interview participants or their families in the past year. Participants were also asked about the occurrences of certain ailments in their households and their causes. The most commonly cited worst diseases were cancer and jaundice (both received six responses). When probed about ailments or diseases specific to the respiratory system and breathing, participants had contrasting beliefs.

The constant occurrence of wheezing among different members in the household was commonly discussed. Some participants mentioned the older members of the home were often affected, while others mentioned the children or themselves afflicted by the symptom. One treatment participant noted, “It is regular” (R15) while a control primary cook commented, “I always have wheezing...” (R8). Seventeen participants had someone in the home affected by wheezing symptoms in the past two weeks. When asked about cough, many participants responded in some variation of “it happens to the whole village.” And almost all of the households had someone in the home suffering from cough at the time of interview.

Despite the reported common occurrences of wheeze and cough, few respondents knew the cause or cure of such ailments. One primary cook from a treatment home responded, “cold and cough is common; like if we get soaked in the rain and then there is

sunshine after it, because of that we get sore throat and cough” (R16). Another respondent from the treatment group answered, “In rain, in eating habits, in eating rice, in eating tomatoes, they create cold and cough” (R3). Many respondents cited other foods as causes for cough as well.

Other more serious diseases also had similar misunderstandings. More than three-quarters of the interview sample knew of pneumonia but over half thought it was the same as typhoid, while three considered it the same as tuberculosis, and one thought it the same as malaria. One primary cook told us, “typhoid, pneumonia-typhoid, they’re the same” (R5). About half of the respondents cited chest pain, wheezing, cold or fever as common causes of pneumonia. The other responses were almost all different. One participant noted, “jaundice is the reason [for pneumonia], if there is less blood in the body every disease catches you” (R17) while another responded, “We don’t have much knowledge but people talk about it and we have heard from them...if someone is out in the cold...it can further lead to pneumonia” (R21). There was an overall misunderstanding regarding the causes, symptoms, and descriptions of many of the local respiratory illnesses and infections.

## 4. Discussion

This study explored the perceptions related to the use and health effects of traditional and improved cookstoves in treatment and control households in Uttarakhand, India. Treatment households received the intervention, consisting of ICS sales marketing and an educational campaign, whereas control households did not. Findings from this study suggest that experiences with ICS vary based on household characteristics as well as individual perceptions of benefits and problems of the stoves. Experiences with ICS are neither overwhelmingly positive nor negative.

Household financial status was a reason for purchase, use and nonuse of both the ICS and traditional stove. Households with access to credit and savings may be more likely to purchase a new technology given that they may plan more for the future or simply have experience with credit and payments. The cost of the stove and fuels to run it were factors affecting use. Other studies have cited cost as a significant barrier to adoption (Levine et al. 2012), but rarely explored it as a hurdle to sustained use.

The cost of ICS fuels was a drawback and significantly associated with relative wealth. Building a cheap stove from mud versus paying for one to run on electricity are very different and only some households can afford the bill associated with increased voltage use. Having received the treatment was also a significant factor in choosing fuel cost as a worst attribute, suggesting that those with knowledge of ICS (and purchasers with experience) are more likely to dislike the cost of fuels associated with them. Furthermore, households that had used an intervention stove in the past two weeks were

twofold more likely to report dislike of fuel cost, providing a link between use of the stove and knowledge of how much fuel costs.

Due to women enduring the most negative effects from smoke, female respondents citing smoke as the worst factor of the traditional stove is an expected outcome. Similarly, female respondents more likely to report cleaning as a negative feature of the *chullah* illustrated that females do notice the effects of cooking on the *chullah*.

Wide variation exists among G-coil and Greenway users' perceptions of the stove, suggesting it would be difficult to ensure sustained use of a single improved stove design unless it addresses all facets of the positive and negative perceptions, including requiring less structural maintenance (a better quality wire on the electric stove, for example), a stand over the coil, less voltage (which reduces the electricity bill), and a larger opening on the Greenway for wood insertion. Even with improvements, the G-coil still does not make the local bread, a feature that must be addressed for sustained use and full adoption by these households. This further illustrates the need for culturally appropriate options.

More than half of all households in the qualitative sample said there is no health impact from using an ICS; ten of these women were in treatment households that received the educational demonstration. Additionally, treatment households were less likely to identify smoke as unsafe for health in the follow-up survey. While treatment households were part of the educational campaign, it is possible that the respondents were not present at that time, or do not make the connection between smoke and the effect it has on health. Respondents made concrete connections of fire leading to smoke and

smoke leading to eye irritation, but other less visible and obvious consequences of smoke, such as cough and pneumonia, were rarely connected. This may be due to pervasive misconceptions (among the qualitative sample) regarding the causes and definitions of these infections and diseases. While many interview respondents mentioned that ICS do produce less smoke and that the smoke from their *chullah* affects their eyes, it is unclear whether the connection has been made that smoke affects health. More research is necessary to better understand this obvious disconnect.

It is evident that purchase of the stove does not inevitably lead to use, therefore we must target households using strong educational campaigns about the effects of smoke in the home, making clear that smoke does *not* have to be a normal aspect of daily life, but it is a health threat that can be reduced or eliminated.

Characteristics associated with use of ICS shed light on factors that may be important to household decision-making when choosing which stove to use. Deciding to use the ICS post-purchase was associated with many factors. Results from the qualitative interviews illustrated the importance of incorporating the end user in development of these types of devices. The most salient example of this is G-coil users requesting a stand on their stoves, which was not a feature discussed among the research team or among members of the local NGO as a possible response in the quantitative survey.

Our findings are consistent with a number of papers in this field that find social and health perceptions (for example, taste of food, price of stove, and smoke emitted) are major forces driving use and/or nonuse of traditional and improved cookstoves (Troncoso et al., 2007; Bielecki & Wingebach, 2013; Mukhopadhyay et al., 2012). This study

provides further evidence that stove stacking is prevalent and that fuel cost and stove design are important factors in maintaining *sustained* use of ICS.

We believe that these findings would be transferable to similar populations with comparable cultural, social, and economic characteristics, but these findings might be less applicable in urban areas, where resource constraints are not as common and cooking practices differ. Despite the fact that balance tests were administered to ensure consistency among interview households, there could still be systematic differences among those selected for interviews. Additionally, not all respondents for the qualitative interviews were the primary cooks of their homes; therefore the respondent may have differing views regarding cooking, health and stoves from those of the primary cook. More interviews should be conducted to increase sample size and capture a broader range of respondents, in particular Greenway stove owners. While all enumerators and interviewers were extensively trained, data collection error is a reality and may have affected responses in both quantitative and qualitative methods.

#### ***4.1 Implications for Further Research***

Wide variability among geographic regions means there is no single or simple answer to ameliorating the health effects of indoor air pollution. Behavior change is slow and difficult to bring about. This field could benefit from behavior change communication campaigns and strong educational and health interventions that address lack of information and knowledge of common diseases and major causes of respiratory illnesses, such as smoke. If we can bridge the knowledge gap among locals between

diseases, smoke, and cooking practices, we have a stronger likelihood of combating household air pollution and ensuring the sustained use of ICS.

Given that purchase of an ICS does not lead to abandonment of traditional cooking methods, we need better measures of stove utilization. Effective sensor monitoring, such as placing an air quality sensor near stoves to measure use, could be useful in the short term for tracking. Additional qualitative interviews that reach more purchasing households and delve deeper into reasons for use and disuse should also be considered.

Maintaining one's stove is a part of everyday life in this region. Women are accustomed to putting new mud on their stoves every other day, which requires a great deal of work. Maintaining an ICS requires less time, but the initial intervention did not focus on training households in upkeep or cleaning of their new stove. Maintenance education should be included in future interventions. In addition, given logistical and monetary constraints, few households have the resources for stove repairs; therefore when a stove breaks it is rendered unusable and the household reverts back to the *chullah*. Maintenance plans and warranty schemes are worth further research.

Creating a profile of the type of households most likely to sustain *use* of these technologies is important in future interventions. Our results shed light on the types of homes and features liked and disliked in the stoves, providing a framework that informs the design of new stoves and interventions in similar regions.

## **5. Conclusion**

This study provides insight into features of improved cookstoves and perceptions of benefits of use among the study population in Uttarakhand, India. Our research informs on characteristics of households and discovers heterogeneity of preferences of ICS among households and primary cooks. Future cookstove intervention programs will benefit from this understanding, and our findings can lead to more effective implementation that ensures sustained use of ICS. Although this study sheds light on use of improved cookstoves as an environmental health technology, much remains unknown, and follow-up is often lacking. We must continue to sponsor such interventions and research, and should pay close attention to methods that encourage households to use their ICS.

## Appendix A: Intervention Educational Pamphlet (with English translation)

उन्नत चूल्हा अपने घर ले जाइये। अपने परिवार और जंगल को बचाइये।			
चूल्हे	<b>अंगीठी</b> 	<b>उन्नत चूल्हा ग्रीनवे</b> 	<b>उन्नत चूल्हा जी-कोईल</b> 
ईंधन की जरूरत	 <b>100% खर्च</b> 	 <b>70% खर्च</b> 	
समय की बचत			
धुआं और सेहत	 <b>100%</b> 	 <b>65% कम</b> 	 
हल्का करंट			<b>कभी कभी* हल्का सा करंट लग सकता है।</b> <small>* गीले नंगे पाव; बरसात या अर्थिंग की समस्या।</small>
दाम	<b>0</b>	<b>1300 रुपए</b> 	<b>900 रुपए</b>  <b>महीने का बिजली का बिल बढ़ेगा :</b> 2 महीने 1 घन्टा रोज = रु 260 2 महीने 2 घन्टे रोज = रु 525
किश्त	<b>0</b>	<b>460 रुपए की 3 किश्त हर 2 हफ्ते बाद</b>	<b>320 रुपए की 3 किश्त हर 2 हफ्ते बाद</b>
 <b>कम ईंधन। कम समय। कम धुआं। स्वस्थ परिवार।</b>			

**BUY AN IMPROVED STOVE. SAVE YOUR FAMILY AND YOUR FORESTS.**

<b>STOVES TYPES</b>	<b>Traditional 'angithi' stove</b>	<b>Improved Wood Stove</b>	<b>Improved Electric Stove</b>
<b>FUEL REQUIREMENT</b>	Most firewood use (100%)	Compared to traditional stove, uses 70% of the firewood	Uses electricity. Does not use firewood
<b>COOKING TIME REQUIREMENT</b>	Takes the most time to cook	Takes less time (compared to traditional stoves)	Takes the least time (compared to traditional stove)
<b>SMOKE AND POLLUTION</b>	Most smoke released (100%)	Less smoke (65% compared to traditional stove)	No smoke
<b>ELECTRICAL FEATURES</b>	None	None	As with all electrical products in rural India, use care. Ground your outlets and, during rainy season, wear rubber soled shoes.
<b>PRICE OF STOVE</b>	0 Rs.	1300 Rs.	900 Rs. Monthly electricity bill will increase with use of the electric stove. For example, daily 1 hour stove use will lead to a bill of approx. Rs. 260 over two months and daily 2 hour stove use will lead to a 2 month bill of approx. Rs.525
<b>INSTALLMENTS</b>	0	675 Rs. in 2 installments bi-weekly	470 Rs. in 2 installments monthly

***Less fuel. Less time. Less smoke. Healthy family.***

# Appendix B: Baseline Survey

## COOKING BEHAVIORS IN RURAL INDIA

### A. INTRODUCTION

**Supervisor, please read and ask for informed consent:** Greetings! My name is \_\_\_\_\_, and I am working for TERI in Delhi and Duke University in North Carolina in the U.S.A. TERI conducts research in the energy and environment sector. Duke University is a research university in the USA. Financial support for this study is from the US Agency for International Development. You are being asked to participate in a survey to support a research study on energy use in rural areas. We want to know something about your household – specifically about (1) your cooking practices (2) opinions and perceptions concerning your cooking conditions, (3) health status, (4) and socioeconomic variables. Interviews will be conducted with approximately 2,000 households drawn at random from a list provided by the India Census bureau. Your household was one of those selected to participate. If you decide to participate in this study, you will complete a 40 minute interview with a trained interviewer, and a follow-up interview will be conducted in the next few months. Your participation in the study is completely voluntary. You may choose not to answer any question and you can stop your participation at any time. All information you provide will be kept confidential, that is, your name or other identification will not be associated with your answers to the questions. There is no direct, immediate, and tangible benefit of participating in this survey. However, in the long run many villages including yours can benefit from the improvements in the government policies. If you have any questions or concerns, please contact Rakesh at +91 XXX.

A.1. **Supervisor only:** Are you willing to complete this interview and participate in this study?

[0] No (**Supervisor: Thank you for your time! Terminate the interview.**)

[1] Yes

A.2. Questionnaire

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A.3.a. Conjoint Group # (1-9): \_\_\_\_\_

b. Order of cards from group: 1<sup>st</sup> card \_\_\_\_\_ 2<sup>nd</sup> card \_\_\_\_\_ 3<sup>rd</sup> card \_\_\_\_\_ 4<sup>th</sup> card \_\_\_\_\_

A.4. Section B (Perceptions) assignment: [ 1 ] Primary cook [ 2 ] Head of household

**INTERVIEW OUTCOME**

Number of Visit			
	1	2	Final Visit
A.5. Date	__/__/__ DD/MM/YY	__/__/__ DD/MM/YY	__/__/__ DD/MM/YY
A.6. EnumeratorID	____	____	____
A.7. Result*	<b>NO RETURN VISIT NEEDED</b> (1) Completed (2) Refused (3) Partially completed, return visit not agreed to (4) People absent for extended period of time (5) Dwelling empty (6) Partially completed, return agreed (7) No eligible person present (8) Other: _____		<b>RETURN VISIT INDICATED</b> (9) Dwelling vacant or address not a dwelling ( <i>2<sup>nd</sup> rounds</i> ) (10) Dwelling destroyed ( <i>2<sup>nd</sup> rounds</i> ) (11) Dwelling not found ( <i>2<sup>nd</sup> rounds</i> ) (12) Dwelling occupied by family not interviewed in earlier round ( <i>2<sup>nd</sup> rounds</i> )
A.8. If return visit indicated, enter date			
<b>FIELD</b>		<b>OFFICE</b>	
A.9. Interviewer Completed Date	A.10. Field Supervisor Checked Date	A.11. Study Supervisor Checked Date	A.12. Data Entry Date
__/__/__	__/__/__	__/__/__	__/__/__
Person's ID	Person's ID	Person's ID	Person's ID

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**LOCATION INFORMATION**

A.13. Survey Round No.:

A.14. a. Village Name: \_\_\_\_\_

b. Village Code:

c. Village Sub-Group:

A.15. Head of Household Name: \_\_\_\_\_

A.16. Cell Phone Number (optional): \_\_\_\_\_

A.17. Time Started:

A.18. Time Ended:

A.19. What is your religion?

[ 0 ] No religion

[ 1 ] Hindu

[ 2 ] Muslim

[ 3 ] Christian

[ 4 ] Sikh

[ 5 ] Buddhist/Neo-Buddhist

[ 6 ] Jain

[ 7 ] Jewish

[ 8 ] Zoroastrian/ parsi

[- 95 ] Other (specify \_\_\_\_\_)

[- 9 ] Don't know / not sure

A.20. What is your caste or tribe? (*write the name*) \_\_\_\_\_

A.21. What is the government assigned category of your caste? (*If respondent does not/is not sure, ask GP for appropriate category based on answer above.*)

[ 0 ] No caste

[ 1 ] SC

[ 2 ] ST

[ 3 ] Nomadic tribe (NT)

[ 4 ] OBC

[ 5 ] De-notified tribes

[ 6 ] Open / general

[- 95 ] Other (specify \_\_\_\_\_)

[- 9 ] Don't know / not sure

A.22. a. Are you below poverty line (BPL) or above poverty line (APL)?

[ 1 ] Below poverty line (BPL) (White or yellow ration card)

[ 2 ] Above poverty line (APL) (Red ration card)

[-9 ] Don't know / not sure [-99 ] Refused to answer

b. **Enumerator, did you have to prompt respondent with color of ration card?** [ 0 ] No [ 1 ] Yes

**We would first like to speak with the primary cook of the household. Later, we would like to talk with the head of the household.**

A.23. *Enumerator, continue interview with the primary cook for the household. If the primary cook is not available, continue with the head of the household. Then record below:*

a. *Is the primary cook available?* [ 0 ] No (*Continue to A.23.b*)  
[ 1 ] Yes, record name: \_\_\_\_\_ (*Skip to A.24*)

b. *Is the head of the household available?* [ 0 ] No (*Stop interview and consult with supervisor*)  
[ 1 ] Yes, record name: \_\_\_\_\_

A.24. Can you: a) read a newspaper? [ 0 ] No [ 1 ] Yes  
b) maintain household accounts? [ 0 ] No [ 1 ] Yes

**Enumerator: Check A.4: If "1" is circled, ask Section B to the primary cook. If not available, ask Section B to head of household.  
If "2" is circled, ask Section B to the head of household. If not available, ask Section B to primary cook.**

## B. INFORMATION AND PERCEPTIONS

### Information on cookstoves and air pollution.

	[MESSAGE]	B.1. Have you ever heard about how your cooking practices [MESSAGE]?  [ 0 ] No ( <i>Skip to next message</i> ) [ 1 ] Yes ( <i>Continue to B.2 for this message</i> )	B.2. From where did you hear about [MESSAGE]? ( <i>Choose from below; circle all</i> ) 1. Posters / hoardings/wall paintings; 2. TV advertisement; 3. Radio advertisement; 4. Aanganwadi, doctor, ANM & othersocial workers ; 5. School lessons & teachers(including school goingchildren); 6. Film shows / exhibitions; 7. Street plays / puppet shows, Local tales 8. Family members & friends; 9. Leaflets / pamphlets /brochures; 10. Newspaper & magazines; 11. Temple / mosque / church; 12. Self-help group meetings; 13. Realized by oneself -95 Other	B.3. What can you do to reduce the negative impacts? ( <i>choose from below; circle all</i> ) 0. Nothing 1. Keep children out of kitchen; 2. Burn less firewood; 3. Add chimney to stove 4. Cook outside; 5. Put ash and mud on vessel; 6. Use cleaner stove; 7. Use cleaner-burning fuels; 8. Plant trees -95 Other	B.4. Have you heard of some stoves that produce less smoke than others? [ 0 ] No [ 1 ] Yes	B.5. Do you think some fuels produce less smoke than others? [ 0 ] No [ 1 ] Yes	B.6. <i>Enumerator:If "No" For B.4. and B.5., skip to next message.</i> On a scale of 1 to 5, do you believe that your use of improved stoves and clean fuels can modify these negative impacts? (1 no impact, 2 if small impact, 3 medium impact, 4 large impact, 5 highly beneficial impact)
1	Negatively impact your family's health – especially young children	0 1	1 2 3 4 5 6 7 8 9 10 11 12 13 -95	0 1 2 3 4 5 6 7 8 -95	0 1	0 1	1 2 3 4 5
2	Negatively impact local forests and watersheds	0 1	1 2 3 4 5 6 7 8 9 10 11 12 13 -95	0 1 2 3 4 5 6 7 8 -95	0 1	0 1	1 2 3 4 5
3	Negatively impacts local air quality and climate change	0 1	1 2 3 4 5 6 7 8 9 10 11 12 13 -95	0 1 2 3 4 5 6 7 9 -95	0 1	0 1	1 2 3 4 5

**Experience / perceptions of different stoves**

	[ATTRIBUTE]	B.7. What are the two best attributes of traditional mud stoves, in order of importance? <i>Enumerator: circle only two. Circle "1" for the best feature, and "2" for the second best feature</i>	B.8. What are the two worst attributes of traditional mud stoves, in order of importance? <i>Enumerator: circle only two. Circle "1" for the worst feature, and "2" for the second worst feature</i>	B.9. What are the two best attributes of improved stoves, in order of importance? <i>Enumerator: circle only two. If respondent does not know about improved stoves, skip to B.11. Circle "1" for the best feature, and "2" for the second best feature?</i>	B.10. What are the two worst attributes of improved stoves, in order of importance? <i>Enumerator: circle only two. Circle "1" for the worst feature, and "2" for the second worst feature?</i>
1	The cost of the stove	1 2	1 2	1 2	1 2
2	The smoke produced by the stove	1 2	1 2	1 2	1 2
3	The speed of cooking	1 2	1 2	1 2	1 2
4	The ability to cook all foods	1 2	1 2	1 2	1 2
5	The taste of the foods	1 2	1 2	1 2	1 2
6	The number of dishes that can be prepared with the stove	1 2	1 2	1 2	1 2
7	The number of people that the stove can feed	1 2	1 2	1 2	1 2
8	The amount of fuel required	1 2	1 2	1 2	1 2
9	The type of fuel required	1 2	1 2	1 2	1 2
10	The maintenance of the stove, including repair cost	1 2	1 2	1 2	1 2
11	The cleaning requirement	1 2	1 2	1 2	1 2
12	The portability of the stove	1 2	1 2	1 2	1 2
13	Stove gives off heat	1 2	1 2	1 2	1 2
14	Other 1, specify:	1 2	1 2	1 2	1 2
15	Other 2, specify:	1 2	1 2	1 2	1 2

## PERCEPTIONS

I want you to think about the smoke that is generated by a traditional chulha. I want to play a game with you to understand what you think about this smoke and its effects on your health.

Here is a sheet of paper. On it I have drawn two circles, one is labeled safe, one is labeled not safe. And here are ten candies. I want you to place the candies in the two circles – safe or unsafe – according to how you think the smoke affects your health. For example, if you think the smoke is perfectly safe to breathe and has no negative effects on health, you will place all ten candies in the circle labeled “safe.” On the other hand, if you think this smoke is definitely not safe to breathe and will certainly make you sick, place all ten candies in the circle labeled “unsafe.” If you think there is an equal chance that this smoke will make you sick or not sick, you will put five candies in each circle. Or if you think there is slightly lower chance that you will get sick than not sick, you might place 7 or 8 candies in the safe circle.

Do you have any questions about this game? (*Enumerator, answer or clarify any questions that are asked*)

B.11. Now, please put the candies in the piles according to how you feel the smoke will affect your health. (*Enumerator, the number of candies placed in the “Safe” pile is indicated below.*)

- |   |   |
|---|---|
| <input type="checkbox"/> 0 ] Zero candies in safe pile  |   |
| <input type="checkbox"/> 1 ] One candy in safe pile     | <input type="checkbox"/> 6 ] Six candies in safe pile                                       |
| <input type="checkbox"/> 2 ] Two candies in safe pile   | <input type="checkbox"/> 7 ] Seven candies in safe pile                                     |
| <input type="checkbox"/> 3 ] Three candies in safe pile | <input type="checkbox"/> 8 ] Eight candies in safe pile                                     |
| <input type="checkbox"/> 4 ] Four candies in safe pile  | <input type="checkbox"/> 9 ] Nine candies in safe pile                                      |
| <input type="checkbox"/> 5 ] Five candies in safe pile  | <input type="checkbox"/> 10 ] Ten candies in safe pile                                      |
|   | <input type="checkbox"/> -99 ] Refused to answer ( <i>Enumerator: probe once or twice</i> ) |

B.12. *Who answered these questions?*  1 ] Head of Household  2 ] Primary Cook  3 ] Both

### C. FAMILY ROSTER AND SOCIO DEMOGRAPHICS

Enumerator, Ask primary cook the following questions. If the primary cook is unavailable, as the head of household.

P I D	C.1. Sub- family ID  (Use codes 1, 2, 3, etc to list member s from 1 <sup>st</sup> , 2 <sup>nd</sup> , an 3 <sup>rd</sup> subfamil y.)	C.2. Name all persons living in this household from the oldest to the youngest in each subfamily.  (Exclude visitors. Ask Q5, 7, 8 and record Q6 simultaneously .)	C.3. <i>Return to this question to fill in at the end of the interview. Please circle the number "1" if this person responded to any question in the survey.</i>  (1) Yes	C.4. Sex  (Don't ask but observe in case of respondent. )  (1) Male (2) Female	C.5. How old is [NAME]?			C.6. What is [NAME]'s relationship to the head of household?  (1) Head (2) Wife/husband (3) Child/adopted child (4) Grandchild (5) Niece/nephew (6) Father/mother (7) Sister/brother (8) Son/daughter-in-law (9) Brother/sister-in-law (10) Grandfather/mother (11) Father/mother-in-law (12) Other relative (13) Servant or servant's relative (14) Tenant or tenant's relatives (-95) Other (specify )	C.7. What is the current marital status of [NAME]?  (1) Married (2) Divorced (3) Separated (4) Widow or widower (5) Never married (-9) Don't know / not sure	P I D
					Years	Month s	Day s			
1			1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	1
2			1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	2
3			1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	3
4			1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	4
5			1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	5
6			1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	6
7			1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	7
8			1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	8
9			1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	9
10			1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	10
11			1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	11
12			1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	12
13			1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	13
14			1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	14



8		1 2 3 4 5 6 7 8 9 10 11 12 13 14 - 95		1 2	0 1 2 -9			8
9		1 2 3 4 5 6 7 8 9 10 11 12 13 14 - 95		1 2	0 1 2 -9			9
10		1 2 3 4 5 6 7 8 9 10 11 12 13 14 - 95		1 2	0 1 2 -9			10
11		1 2 3 4 5 6 7 8 9 10 11 12 13 14 - 95		1 2	0 1 2 -9			11
12		1 2 3 4 5 6 7 8 9 10 11 12 13 14 - 95		1 2	0 1 2 -9			12
13		1 2 3 4 5 6 7 8 9 10 11 12 13 14 - 95		1 2	0 1 2 -9			13
14		1 2 3 4 5 6 7 8 9 10 11 12 13 14 - 95		1 2	0 1 2 -9			14

## D. ILLNESS: RESPIRATORY AND OTHER

### Respiratory Illness

P I D	D.1. Does [NAME] occasionally have <b>cough &amp; cold</b> ?	D.2. Did [NAME] have <b>cough &amp; cold</b> in last 2 weeks?	D.3. Please think about [NAME]'s most recent case of this illness in the last 2 weeks. Did [NAME] experience the symptom? <i>Read all symptoms one by one.</i>								D.4. How much did you pay for all the treatments and advice you sought for [NAME]'s most recent episode of this illness? Please include all user fees, medicines, transportation, lodging, meals, and other expenses.	
	(0) No <i>(Continue across)</i> (1) Yes <i>(Continue across)</i> (-9) Don't know / not sure <i>(Continue across)</i>	(0) No ( <i>Go to next person</i> ) (1) Yes <i>(Continue across)</i> (-9) Don't know / not sure ( <i>Go to next person</i> )	(0) No (1) Yes (-9) Don't know/not sure	A. Sore throat	B. Runnin g blocked nose / sinusitis	C. Faster than normal breathing	D. Wheezi ng sound in chest / nose	E. Colorless / green / brown mucus / phlegm	F. Fever	G. Hea dache	H. Weakness / tiredness / lethargy	I. O ther (spe cify )
1	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
2	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
3	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
4	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
5	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
6	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
7	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
8	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
10	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		

Illness

1 1	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
1 2	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
1 3	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
1 4	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		

(Continued)

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PI D	D.5. How much time were household members unable to <b>work or go to school</b> because they were caring for [NAME]?  <i>(Record time in days. If less than 1 day, record in hours.)</i>  (-9) Don't know / not sure		D.6. How much time were [NAME] unable to <b>work or go to school</b> because they were too sick?  <i>(Record time in days. If less than 1 day, record in hours.)</i>  (-9) Don't know / not sure		D.7. Did [NAME] have <b>loose stools</b> in the past three months?  (0) No ( <i>Go to next person</i> ) (1) Yes ( <i>Continue across</i> ) (-9) Don't know / not sure ( <i>Go to next person</i> )	D.8. What were the other symptoms [NAME] experienced during loose stools? <i>(Circle all that apply. Spontaneous response. Prompt 1-2 times.)</i>  (0) No other symptoms experienced (1) Watery stool (2) Bloody stool (3) Mucus in stool/white color stool (4) Thirst/dry mouth (5) Dizziness (6) Unconsciousness (7) Sunken soft spot (8) Sunken eyes (9) Very sleepy (10) Irritable/restless (-95) Other (specify _____) (-9) Don't know / not sure	D.9. Did [NAME] have malaria in the past year?  (0) No ( <i>Go to next person</i> ) (1) Yes ( <i>Continue across</i> ) (-9) Don't know / not sure ( <i>Go to next person</i> )	D.10. What symptoms did he/she have? <i>(Circle all that apply. Spontaneous response. Prompt 1-2 times.)</i> (1) Fever (2) High fever / delirium (3) Headache (4) Shaking and chills (5) Nausea (6) Vomiting (7) Dizziness (8) Shortness of breath (9) Pain (10) Tiredness / fatigue (11) Convulsions / seizure (-95) Other (specify _____) (-9) Don't know / not sure	D.11. Has [NAME] ever had TB? [ 0 ] No [ 1 ] Yes [-9] Don't know	PI D
	Hrs.	Days	Hrs.	Days						
1					0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	1
2					0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	2
3					0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	3

4					0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	4
5					0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	5
6					0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	6
7					0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	7
8					0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	8
9					0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	9
10					0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	10
11					0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	11
12					0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	12
13					0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	13
14					0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	14

## E. HOUSING, COOKING, AND FUEL

### STOVE CHARACTERISTICS AND USE

SID	Stove Types	E.1 Do you own [TYPE]  [0] No (Go to next stove option)  [1] Yes (Continue across)	E.2. How many of [TYPE] do you own?  <i>Write number</i>	E.3.How is this stove ventilated? ( <i>circle all; Enumerator please look</i> ) [ 0 ] None [ 1 ] Windows [ 2 ] Openings in wall (hole) or raised roof [ 3 ] Chimney [ 4 ] Fan [ 5 ] Door to outside [ -9 ] Don't know / not sure	E.4. How many burners does this stove have?  [ 1 ] One [ 2 ] Two [ 3 ] Three [ 4 ] More than three	E.5. How long have you had [STOVE]?  <i>Write # of years. If less than 1 year, write &lt;1.If always used, write Always.</i>	E.6. Has this stove been used in the past week?  [ 0 ] No <i>Go to E7</i> [ 1 ] Yes <i>Skip to E8</i>	E.7. Why is it not used in past week?  [ 0 ] Stove not needed [ 1 ] Broken [ 2 ] Under construction [ 3 ] Heat from stove [ 4 ] No fuel [ -95 ] Other	E.8. How often do you use this [STOVE]?  [ 1 ] Daily [ 2 ] Few times per week (3-4 times) [ 3 ] Rarely
[1]	Mittikachula – Single Pot / Traditional anjeti stove	0 1		0 1 2 3 4 5 -9			0 1	0 1 2 3 4 -95	1 2 3
[2]	Mittikachulha – Multiple Pot	0 1		0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 -95	1 2 3
[3]	Traditional 3 stone stove	0 1		0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 -95	1 2 3
[4]	Kerosene stove-Pump	0 1		0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 -95	1 2 3
[5]	Kerosene stove-Wick	0 1		0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 -95	1 2 3
[6]	LPG-Stove	0 1		0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 -95	1 2 3
[7]	Electric	0 1		0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 -95	1 2 3
[8]	Biogas/Gobar Gas	0 1		0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 -95	1 2 3
[9]	Cast iron Biomass stove (Sagarh)	0 1		0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 -95	1 2 3
[10]	Coal stove	0 1		0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 -95	1 2 3
[11]	Commercial	0 1		0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 -95	1 2 3

		“improved” cook stove																					
[12]	Others (specify)	0	1	0 1 2 3 4 5 -9				1 2 3 4		0	1	0 1 2 3 4 -95				1 2 3							
SI D	Stove Types	E.9. For a typical day when this [STOVE] is used, how many hours is this stove on / working / used for ONLY cooking or heating water for tea, or other uses?		E.10 How much does it cost to replace this stove?  (Rs. and/or time for construction)  <i>Note: This is the stove cost; it does not include the cost of fuel</i>		E.11. How long does the stove last before breaking?		E.12. What is the cost to repair the stove if it breaks?  (Rs. and/or time for construction)  <i>Note: This is repair cost; it does not include the cost of fuel</i>		E.13. Where is this stove located( <i>circle all; Enumerator please look</i> )?  [ 1 ] Inside the house with no partition (kitchen and living rooms same) [ 2 ] Inside the house with partition (kitchen and living rooms same) [ 3 ] Inside the house with separate room (kitchen and living rooms different) [ 4 ] Attached room outside the house but separate entrance [ 5 ] Outside the house in a stand-alone room [ 6 ] Outside the house on the veranda (underneath roof overhang) [ 7 ] Outside the house; open air [ 8 ] Inside the house, in the courtyard				E.14. <i>Observe: Does the stove look like it has been used recently? (e.g. Signs of ash, warm stove, stove currently in use, etc.)</i>  (0) No (1) Yes (-88) Observation not possible				E.15. <i>Observe: Do you see significant black soot on the wall behind the stove or the ceiling?</i>  [ 0 ] No [ 1 ] Wall is black is soot [ 2 ] Ceiling is black with soot [-88] Observation not possible					
		Hrs	Mins	Rs.	Time (Hrs)	Months	Years	Rs.	Time (Hrs)														
[1]	Mittikachula – Single Pot / Traditional anjeti stove									1	2	3	4	5	6	7	0	1	-88	0	1	2	-88
[2]	Mittikachula – Multiple Pot									1	2	3	4	5	6	7	0	1	-88	0	1	2	-88
[3]	Traditional 3 stone stove									1	2	3	4	5	6	7	0	1	-88	0	1	2	-88
[4]	Kerosene stove-Pump									1	2	3	4	5	6	7	0	1	-88	0	1	2	-88
[5]	Kerosene stove-Wick									1	2	3	4	5	6	7	0	1	-88	0	1	2	-88
[6]	LPG-Stove									1	2	3	4	5	6	7	0	1	-88	0	1	2	-88
[7]	Electric									1	2	3	4	5	6	7	0	1	-88	0	1	2	-88
[8]	Biogas/Gobar Gas									1	2	3	4	5	6	7	0	1	-88	0	1	2	-88

[9]	Cast iron Biomass stove (Sagarh)									1 2 3 4 5 6 7	0 1 -88	0 1 2 -88
[10]	Coal stove									1 2 3 4 5 6 7	0 1 -88	0 1 2 -88
[11]	Commercial “improved” cook stove									1 2 3 4 5 6 7	0 1 -88	0 1 2 -88
[12]	Others (specify)									1 2 3 4 5 6 7	0 1 -88	0 1 2 -88

E.16. Do you burn waste? *(Multiple answers possible; circle all that apply):*

[ 0 ] Do not burn waste

[ 1 ] Indoors

[ 2 ] Outdoors near house

[ 3 ] Outdoors in community dump

[-95 ] Other (Specify: \_\_\_\_\_)

[-9 ] Don’t know/ Not sure

E.17. Do you burn agricultural waste in the field?

[ 0 ] No

[ 1 ] Yes

## FUELS USED

FID	Cooking fuel	E.18. Do you use [FUEL] ?  <b>Circle all</b>  [0] No [1] Yes	E.19. <i>Ask and observe:</i> Do you have any of this fuel in the house at this time?  (0) No (1) Yes	E.20. How regularly do you use it?  [ 1 ] Daily [ 2 ] Few times a week [ 3 ] Rarely	E.21. How much money do you spend on this fuel each month? <i>In Rs. (If reported in years or weeks, please indicate it. If all of this fuel is collected by hh, write “0”)</i>	E.22. How long does it take you to prepare the fuel every day, not including collection time? (chopping wood, adding dung to gobar gas plant, etc.)	E.23. Who in the household collects this fuel?  <i>Enumerator: Please indicate below all persons from the household roster who collect wood (Write all PIDs)</i>	E.24. How much time does your household spend collecting or bringing this fuel home in a typical day / week / month (hrs)  <i>(Record number of hours; circle unit for period reported)</i>	E.25. How much of this fuel do you use on average?  <i>(Unit per day/ week/ month)</i> <i>For example, one cylinder of LPG lasts 3 months, write “Cylinder” for unit; “1/3” for amount; and “[3]” for time period.</i>
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			Have fuel?	Observed?		Rs / month	(1) Harvest season (2) All year	Minutes per day	Hours per day	Indicate all PIDs	Hrs	Time period [1] day [2] week [3] month	Unit	Amount	Time period [1] day [2] week [3] month
1	Firewood	0 1	0 1	0 1	1 2 3		1 2					1 2 3			1 2 3
2	Crop residues, twigs	0 1	0 1	0 1	1 2 3		1 2					1 2 3			1 2 3
3	Leaves	0 1	0 1	0 1	1 2 3		1 2					1 2 3			1 2 3
4	Dung cakes	0 1	0 1	0 1	1 2 3		1 2					1 2 3			1 2 3
5	Biomass pellets	0 1	0 1	0 1	1 2 3		1 2					1 2 3			1 2 3
6	Kerosene	0 1	0 1	0 1	1 2 3		1 2					1 2 3			1 2 3
7	LPG	0 1	0 1	0 1	1 2 3		1 2					1 2 3			1 2 3
8	Electricity	0 1	0 1	0 1	1 2 3		1 2					1 2 3			1 2 3
9	Biogas	0 1	0 1	0 1	1 2 3		1 2					1 2 3			1 2 3
10	Other (Specify _____)	0 1	0 1	0 1	1 2 3		1 2					1 2 3			1 2 3

E.26. If you were to buy the following fuels in the market, what price would you pay? (*Enumerator: Record the price the respondent says he/she would actually pay, for example if the fuel is only available on the black market*)

- a. Firewood: \_\_\_\_\_ Rs/quintal (1 quintal = 100 kg) [ -9 ] Don't know/ Not sure
- b. Dung cakes: \_\_\_\_\_ Rs/patty [ -9 ] Don't know/ Not sure
- c. LPG: \_\_\_\_\_ Rs/cylinder (1 cylinder = 14.2kg) [ -9 ] Don't know/ Not sure
- d. Kerosene: \_\_\_\_\_ Rs/cylinder (1 cylinder = 14.2kg) [ -9 ] Don't know/ Not sure

E.27. Are any of the women in this household member of a women's club / self-help group (SHG)?

- [ 0 ] No – not a member
- [ -98 ] No - no women's club or SHG in village (*Skip to next section*)
- [ 1 ] Yes

E.28. What are the responsibilities of members of women's club / SHGs in this village? (*Circle all that apply*)

- [ 1 ] Attend group meetings
- [ 2 ] Save the amount agreed upon with other members
- [ 3 ] Taking loan from bank
- [ 4 ] Giving small loans to each other
- [ 5 ] Pay penalty in case of non-attendance or defaulting in loan repayment
- [-95] Others (Specify \_\_\_\_\_)
- [-9 ] Don't know/ Not sure

E.29. Why did or didn't you (or other women in the household) become a member of the women's club / SHG? **(Circle all that apply)**

- [ 1 ] Membership fee
- [ 2 ] All female villagers were becoming members
- [ 3 ] Financial benefits to members
- [ 4 ] Level of functionality of the SHG/Women's club
- [ 5 ] Time required for club
- [-95] Others (Specify \_\_\_\_\_)

## F. CONJOINT

*Enumerator, proceed now with the head of the household. Only if head of the household is not available, complete Section F with primary cook.*

F.1. **Enumerator:** is the head of the household available?  [ 0 ] No **Skip to F.3.**  
 [ 1 ] Yes **Continue to F.2.**

F.2. Can you a) read a newspaper?  [ 0 ] No  [ 1 ] Yes  
b) maintain household accounts?  [ 0 ] No  [ 1 ] Yes

We will now have a different exercise. This exercise involves three different cooking options: a traditional chulha (mittikachula or angiti), an improved stove with one opening, and an improved stove with two openings.

**Traditional Chulha (give the participant the card):** This stove is the homemade traditional stove. It burns wood and other fuels. Most of you are currently using it or have used it before, hence you are familiar with this cooking option.

**Improved stove for single pot (give the participant the card):** In this stove, you place cut pieces of wood inside the stove and light it the way you would light your chulha. This stove is designed in a way that makes it easy to start a fire quickly and can produce a much hotter and cleaner fire that uses significantly less fuel. This means faster cooking, time and fuel savings. This stove is portable – you can use it inside or outside your house. The fuel is placed inside the stove from the front. This improved stove is expected to last between 3 and 5 years, but requires occasional maintenance to repair it, which is estimated to cost 250 Rs. per year.

Improved stove for double pot (**give the participant the card**): This stove is similar to the improved stove with one burner, except it has two openings that can hold two pots at once. The fire burns primarily under the first burner, so the second opening does not get as hot, but can be used for slow cooking, for keeping things warm, or for simmering. Again, the fuel is placed inside the stove from the front. This improved stove is expected to last between 3 and 5 years, but requires occasional maintenance to repair it, which is estimated to cost 250 Rs. per year.  
Do you understand each of these cooking options?

I want you to consider four different features of each of these options. They are the price, the amount of smoke that is produced, the fuel requirement, and the number of openings of the stoves.

**Price:**

The first attribute is price. Price is how much you must pay for the stove. The total price of the stove is shown using one thousand and five hundred rupee notes. (***Please show the card which explains the price attribute.***)

In the example at the bottom of the card, the price is shown by two one-thousand rupee notes and one 500 rupee note; thus the stove costs 2500 rupees. Do you have any questions about the price attribute? (***Answer any questions or clarify for participants***)

**Smoke:**

The second attribute is smoke. (***Please show the card which explains the smoke attribute.***) This attribute represents the amount of smoke that is generated during cooking. Some stoves allow more efficient burning of fuel and produce less smoke. The 1<sup>st</sup> symbol represents low amounts of smoke; the 2<sup>nd</sup> symbol represents high amounts of smoke; the 3<sup>rd</sup> symbol represents the highest amounts of smoke.

∞ Do you have any questions about the smoke attribute? (***Answer any questions or clarify for participants***)

**Fuelwood Requirement:**

The third attribute is the fuelwood requirement of the stove. (***Please show the card which explains the fuel requirement attribute.***) Different stoves require different types and amounts of fuelwood. The number of symbols corresponds to the amount of fuelwood needed by the stove, compared to the traditional stove. Also, you should know that the improved stoves really work best when only wood is used. You can use other fuels in it (like dung, leaves and grass), but that really decreases the advantages of the improved stoves.

Do you have any questions about the fuel attribute? (***Answer any questions or clarify for participants***)

**Number of stove openings:**

The final attribute is the number of openings in the improved stove, for placing pots. (***Please show the card which explains the number of openings.***) As I showed you in the stove pictures, different improved stoves have different numbers of openings. Traditional stoves also may accommodate different numbers of pots. The first symbol shows a stove with only one opening; the second one has two openings. When you compare the improved stoves with your own traditional (or the other stove you use), you should consider the number of pots you can cook on it at one time.

Do you have any questions about the attribute for the number of openings? (***Answer any questions or clarify for participants***)

**Comprehension test**

***(Enumerator: Show comprehension test card)***

Now I want to make sure you understand the attributes. I am going to show you different symbols that correspond to what I just told you, and I want you to tell me what they mean.

F.3 What does the following picture mean?

***(Answer: Price of the stove is 3000 rupees)***

- 1 ] Correct answer was given  
 2 ] Incorrect answer was given

F.4 What is the difference between these two pictures? ***(Answer: The difference is the amount of smoke – low (left) or high (right))***

- 1 ] Correct answer was given  
 2 ] Incorrect answer was given

F.5 What is the difference between these two pictures? ***(Answer: The difference is the amount of fuel wood required – 1 unit (left) or 3 units (right))***

- 1 ] Correct answer was given  
 2 ] Incorrect answer was given

F.6 What does the picture mean?

***(Answer: The picture shows an improved stove that holds 2 pots)***

- 1 ] Correct answer was given  
 2 ] Incorrect answer was given

6) ***(Enumerator, if the respondent makes a mistake, please correct him/her and explain that particular attribute again. Do not proceed until the respondent understands all attributes.)***

I will now show you cards with different hypothetical combinations of these stove features. Note that these specific kinds of stoves do not necessarily exist, but that we want to understand which aspects are most important to you. In each card, I would like you to choose which of the three options you would prefer. Each card is separate; you can only choose one of the three options on that card. In other words, when doing the second card, you cannot choose an option from the first card, even if you really liked it.

Two of the three options on each card will be improved stove options; the third will always be your traditional stove. There are no wrong or right answers to these questions. When you make your choice, keep in mind your household budget and your other financial constraints. You should consider carefully whether the benefits of an improved stove would be worth paying for their cost, in terms of stove cost and maintenance requirement. Remember that the improved stoves last 3 to 5 years and cost about 250 Rs. per year to maintain.

Do you have any questions about what I have said? ***(Enumerator, allow the respondent to ask questions and respond by repeating parts of the description above as necessary. Please note any difficult questions that you do not know how to answer below)***

***(Enumerator: Please give the first choice card, and talk through the options to make sure participants understand)***

**F.7. First card: Group # \_\_\_\_\_ Card # \_\_\_\_\_**

Here is the first card. ***(Enumerator: Please give the first choice card, and talk through the options to make sure participants understand).***

Please examine the options in this card, and their different features.

F.7.1 Which stove do you prefer: Improved Stove 1, Improved Stove 2, or Traditional Chulha? (*Enumerator, circle only one*)  
[ 1 ] Improved Stove 1 [ 2 ] Improved Stove 2 [ 3 ] Traditional Chulha [ -9 ] Don't know/ Unsure

F.7.2 Vote: What were the most important attributes of the option you selected, compared to those you did not select? (*Enumerator, multiple answers are possible. Circle all that are mentioned by the respondent*)  
[ 1 ] Price [ 2 ] Smoke [ 3 ] Fuel requirement [ 4 ] Number of openings [ -95 ] Other:  
\_\_\_\_\_

F.7.3 *Enumerator: ask only if the respondent selected an improved stove in F.7.1, otherwise skip to Second Card:* If you had the possibility to purchase this stove at the price stated, would you be willing to make that purchase, if the payment was required at the time of purchase?  
[ 0 ] No [ 1 ] Yes [ -9 ] Don't know / Unsure

**F.8. Second card: Group # \_\_\_\_\_ Card # \_\_\_\_\_**

Here is the second card. (*Enumerator: Please give the second choice card, and talk through the options if necessary, to make sure participants understand*). Please examine the options in this card, and their different features.

F.8.1 Which stove do you prefer: Improved Stove 1, Improved Stove 2, or Traditional Chulha?  
[ 1 ] Improved Stove 1 [ 2 ] Improved Stove 2 [ 3 ] Traditional Chulha [ -9 ] Don't know/ Unsure

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F.8.2 Vote: What were the most important attributes of the option you selected, compared to those you did not select? (*Enumerator, multiple answers are possible. Mark all that are mentioned by the respondent*)  
[ 1 ] Price [ 2 ] Smoke [ 3 ] Fuel requirement [ 4 ] Number of openings [ -95 ] Other

F.8.3 *Enumerator: ask only if the respondent selected an improved stove in F.8.1, otherwise skip to Third Card:* If you had the possibility to purchase this stove at the price stated, would you be willing to make that purchase, if the payment was required at the time of purchase?  
[ 0 ] No [ 1 ] Yes [ -9 ] Don't know / Unsure

---

**F.9. Third card: Group # \_\_\_\_\_ Card # \_\_\_\_\_**

Here is the third card. (*Enumerator: Please give the third choice card, and talk through the options if necessary, to make sure participants understand*). Please examine the options in this card, and their different features.

F.9.1 Which stove do you prefer: Improved Stove 1, Improved Stove 2, or Traditional Chulha?  
[ 1 ] Improved Stove 1 [ 2 ] Improved Stove 2 [ 3 ] Traditional Chulha [ -9 ] Don't know/ Unsure

F.9.2 Vote: What were the most important attributes of the option you selected, compared to those you did not select? (*Enumerator, multiple answers are possible. Mark all*)

*that are mentioned by the respondent)*

[ 1 ] Price  [ 2 ] Smoke  [ 3 ] Fuel requirement  [ 4 ] Number of openings  [-95 ] Other:

\_\_\_\_\_

F.9.3 **Enumerator:** *ask only if the respondent selected an improved stove in F.9.1, otherwise skip to Fourth Card:* If you had the possibility to purchase this stove at the price stated, would you be willing to make that purchase, if the payment was required at the time of purchase?

[ 0 ] No  [ 1 ] Yes  [-9 ] Don't know / Unsure

**F.10. Fourth card: Group # \_\_\_\_\_ Card # \_\_\_\_\_**

Here is the fourth card. (**Enumerator:** *Please give the fourth choice card, and talk through the options if necessary, to make sure participants understand*). Please examine the options in this card, and their different features.

F.10.1 Which stove do you prefer: Improved Stove 1, Improved Stove 2, or Traditional Chulha?

[ 1 ] Improved Stove 1  [ 2 ] Improved Stove 2  [ 3 ] Traditional Chulha  [-9 ] Don't know/ Unsure

F.10.2. Vote: What were the most important attributes of the option you selected, compared to those you did not select? (**Enumerator, multiple answers are possible. Mark all that are mentioned by the respondent**)

[ 1 ] Price  [ 2 ] Smoke  [ 3 ] Fuel requirement  [ 4 ] Number of openings  [-95 ] Other

F.10.3 **Enumerator:** *ask only if the respondent selected an improved stove in F.10.1, otherwise skip to F.11:* If you had the possibility to purchase this stove at the price stated, would you be willing to make that purchase, if the payment was required at the time of purchase?

[ 0 ] No  [ 1 ] Yes  [-9 ] Don't know / Unsure

F.11. After doing these 4 cards, what are the main reasons for the choices you made? (**Enumerator: Do not prompt. Mark all that apply.**)

- [ 1 ] The price is low / affordable to me
- [ 2 ] The smoke is reduced, which is good for the health of the household
- [ 3 ] The smoke is reduced, which will reduce cleaning requirements for pots and in the kitchen
- [ 4 ] The fuel requirement is low, and that means I will save time collecting wood
- [ 5 ] The fuel requirement is low, and that means the local forests and the environment will be conserved
- [ 6 ] I will save time cooking on this stove
- [ 7 ] I can cook more things at one time with this stove, which will make it easier to prepare food that is good to eat
- [ 8 ] I feel comfortable with a mithikachulha
- [-95] Other, specify: \_\_\_\_\_  [-9 ] Don't know/ not sure

F.12. **Who answered these questions?**  [ 1 ] Head of Household  [ 2 ] Primary Cook  [ 3 ] Both

## G. SOCIOECONOMIC CHARACTERISTICS

Ask these questions to the head of household. If this person is unavailable, ask the primary cook.

G.1. How many rooms are there in your house?

- a. Number of rooms used for sleeping and living by your household: \_\_\_\_\_  
 b. Separate rooms used for livestock or storage? [ 0 ] No [ 1 ] Yes  
 c. Number of total rooms: \_\_\_\_\_

G.2. Does your family own this house? [ 0 ] No (**Go to G.4**)

[ 1 ] Yes

G.3. What do you think would be the market value of your house today?

- a. House only: Rupees: \_\_\_\_\_ [ -9 ] Don't know / Not sure  
 b. Plot (land) only: Rupees: \_\_\_\_\_ [ -9 ] Don't know / Not sure  
 c. Total (house and land): Rupees: \_\_\_\_\_ [ -9 ] Don't know / Not sure

G.4. **Only for renter:** How many rooms do you rent and how much do you pay each month for rent?

- a. Number of rooms: \_\_\_\_\_ b. Rupees per month: \_\_\_\_\_

G.5. Does your household own or lease any agricultural lands?

- [ 0 ] Neither (**Go to G.7**)  
 [ 1 ] Own only  
 [ 2 ] Lease only  
 [ 3 ] Own and Lease

G.6. How much land does your household own or lease? (**Record -9 if respondent does not know the answer or is not sure**)

LID	Status	A. Area	B. Unit					
			(1) Acres	(2) Guntha	(3) Hectares	(4) Square feet	(5) Bigha	(-95) Other (specify _____)
1	Owned		1	2	3	4	5	-95
2	Leased		1	2	3	4	5	-95

G.7. What is your main water source?

- [ 1 ] In yard or in house tap [ 2 ] Public tap/standpost  
 [ 3 ] Private dug-well [ 4 ] Private bore well/handpump  
 [ 5 ] Public dug well [ 6 ] Public bore well/hand pump



AID	Asset / consumer durables	How many [ASSET] do you own? (-9) Don't know/not sure
10	Mosquito Net	
11	Pressure Cooker	
12	Cots	

G.12. Imagine a stairway with 6 steps. On the bottom step (step 1), we have the poorest people in this community; on the highest step (step 6), we have the richest people. On which step would you say you are now? (**Circle One**)

[ 1 2 3 4 5 6 ]

[ -99 ] Refused to answer (**Enumerator: probe once or twice**)

G.13. On which step do you think you will be in 4 years?

[ 1 2 3 4 5 6 ]

[ -99 ] Refused to answer (**Enumerator: probe once**)

### Consumption

G.14. Now I want to ask about total consumption of the household. Please exclude from your answer any items purchased for processing or resale in a household enterprise. About how much money does your household spend on...?

Consumption category	Average month (Rs./month)
a. Food (Total estimated)	
i. Cereal or substitutes	
ii. Rice	
iii. Gram / pulses	
iv. Milk / dairy products	
v. Edible oils	
vi. Meat	
vii. Fish	
viii. Eggs	
ix. Vegetables (greens) and roots	
x. Fruits and nuts	
xi. Sugar, salt, spices	

b. Beverages	
c. Cooking fuel	
d. Electricity	
e. Health expenses	
f. Education	
g. Clothing and footwear	
h. Transport	
i. Mobile phone	
j. Liquor and tobacco	
k. Other major expenses	
l. Total (estimated)	

**Income**

**SAFETY NETS**

G.15. Has your household faced any serious burden or crisis?

- [ 1 ] Within last 2 weeks
- [ 2 ] Within last month
- [ 3 ] Within last 6 months
- [ 4 ] Within last year
- [ 5 ] Within last 6 years
- [ 6 ] Not in the last 6 years (**Go to G.18**)
- [ -9 ] Don't know / not sure (**Go to G.18**)

G.16. What type? (**Circle all that apply. Do NOT prompt. Spontaneous response.**)

SN	Burden/Crisis	(1) Yes
1	Major illness, disease or death in the family	1
2	Crop or livestock disease	1
3	Hardships because of floods	1
4	Hardships because of droughts	1
5	Unexpected social or religious event (wedding, funeral, other event)	1
6	Loss of job (e.g., shut-down of local employer),	1

7	Loss of livestock or other assets due to theft or natural causes	1
8	Super cyclone	1
-95	Other (specify _____ )	1

G.17. What did you do (are you doing) to deal with this situation? (*Circle all that apply. Do NOT prompt. Spontaneous response.*)

SN	Coping Actions	(1) Yes
1	Relied on government assistance	1
2	Used remittances	1
3	Taken a loan	1
4	Sold off assets	1
5	Used personal savings	1
6	Work for wages	1
7	Earn extra income	1
8	Contributions by village/community members	1
-95	Other (specify _____ )	1

G.18. In the past or currently has your household received any assistance for under any public scheme? Few example include: Integrated Rural Development Programme (IRDP); National Rural Employment Programme (NREP); Training Rural Youth For Self Employment (TRYSEM); Development of Women and Children of Rural Areas (DWARCA); Indira AwasYojana (IAY); Sanjay Gandhi NiradharYojana (SGNY); Employment Guarantee Scheme (EGS) (*Ask c to d only if answer to a OR b is YES*)

SN	Assistance type	a. Received in the past? 0) No (1) Yes (-9) Don't know / not sure	b. Currently receiving? (0) No (1) Yes (-9) Don't know / not sure	c. What does it provide? (-9) Don't know / not sure			d. How often? (1) Monthly (2) Quarterly (3) Every 6-months (4) Yearly (5) Once in a lifetime (-9) Don't know / not sure
				Money (Rs.)	Materials (Type)	Materials (Amount)	
1	Water	0 1 -9	0 1 -9				1 2 3 4 5 -9
2	LPG	0 1 -9	0 1 -9				1 2 3 4 5 -9
3	Kerosene	0 1 -9	0 1 -9				1 2 3 4 5 -9
4	Sanitation	0 1 -9	0 1 -9				1 2 3 4 5 -9
5	Food and Nutrition	0 1 -9	0 1 -9				1 2 3 4 5 -9
6	Education	0 1 -9	0 1 -9				1 2 3 4 5 -9
7	Old age security	0 1 -9	0 1 -9				1 2 3 4 5 -9
8	Employment	0 1 -9	0 1 -9				1 2 3 4 5 -9
9	Housing and home improvement	0 1 -9	0 1 -9				1 2 3 4 5 -9

SN	Assistance type	a. Received in the past? 0) No (1) Yes (-9) Don't know / not sure	b. Currently receiving? (0) No (1) Yes (-9) Don't know / not sure	c. What does it provide? (-9) Don't know / not sure			d. How often? (1) Monthly (2) Quarterly (3) Every 6-months (4) Yearly (5) Once in a lifetime (-9) Don't know / not sure
				Money (Rs.)	Materials (Type)	Materials (Amount)	
10	Health care	0 1 -9	0 1 -9				1 2 3 4 5 -9
11	Training	0 1 -9	0 1 -9				1 2 3 4 5 -9
12	Child development	0 1 -9	0 1 -9				1 2 3 4 5 -9
13	Disability or death benefit (widows)	0 1 -9	0 1 -9				1 2 3 4 5 -9
14	Pregnancy benefit	0 1 -9	0 1 -9				1 2 3 4 5 -9
-95	Other (specify _____ )	0 1 -9	0 1 -9				1 2 3 4 5 -9

**SOURCE OF CREDIT**

S N	Sources of Credit in this Neighborhood or Locality.	G.19. Has your household taken a loan from [SOURCE] in the last year? (0) No ( <i>Go to next SOURCE</i> ) (1) Yes (-9) Don't know / not sure ( <i>Go to next SOURCE</i> )	G.20. How much did your household borrow (principal amount) from [SOURCE] in the last year? ( <i>record the data for the most recent loan</i> ) (-9) Don't know / not sure	G.21. What is the repayment period for this loan? ( <i>record the data for the most recent loan</i> ) (-9) Don't know / not sure		G.22. What was the interest rate for this loan? (-9) Don't know / not sure ( <i>Go to next SOURCE</i> )
			Rupees	Months	Years	Percent
1	DWARCA, SHG, Chit Funds, ROSCAS, or other small loan giving group (Micro Finance)	0 1 -9				
2	Family or Friends	0 1 -9				
3	Agricultural Co-operative	0 1 -9				
4	Money lender, Employer Landlord	0 1 -9				
5	Commercial Bank (e.g., ICICI Bank) or Grameen or Rural Bank	0 1 -9				
- 95	Other _____	0 1 -9				

**SOURCE OF SAVINGS**

SN	Savings in this Neighborhood or Locality.	G.23. Is it possible for households in this village to save money at [SOURCE] now? ( <i>Prompt: for all SOURCE</i> ) (0) No ( <i>Go to next SOURCE</i> ) (1) Yes	G.24. Has your household saved money at [SOURCE] in the last year? (0) No ( <i>Go to next SOURCE</i> ) (1) Yes	G.25. How much did your household save at [SOURCE]? (-9) Don't know / not sure ( <i>Go to next SOURCE</i> )	G.26. How much interest do these savings earn? (-9) Don't know / not sure ( <i>Go to next SOURCE</i> )

		(-9) Don't know / not sure (Go to next SOURCE)	(-9) Don't know / not sure (Go to next SOURCE)	Rupees	Percent per month	Percent per year
1	DWARCA, SHG, Chit Funds, ROSCAS, or other small loan giving group (Micro Finance)	0 1 -9	0 1 -9			
2	Commercial/Nationalized Bank (e.g., SBI, Andhra Bank, ICICI Bank), Grameen or Rural Bank, Post Office	0 1 -9	0 1 -9			
-95	Other _____	0 1 -9	0 1 -9			

## COMMUNITY PARTICIPATION

G.27. Do you or any members of your household participate in any activities for cleaning your neighborhood and community (outside the immediate limits of your house)

[ 0 ] No (Go to G.29)

[ 1 ] Yes

G.28. Please list all village-cleaning activities for community welfare household members participated in. (*Spontaneous response. Note in the table*). For each of the activities mentioned by you, was this a one-time activity or a repetitive activity?

SN	Activities	Frequency of participation (0) Never(1) One time(2) Repetitive
1	Sweeping streets	0 1 2
2	Cleaning drains	0 1 2
3	Cleaning water sources	0 1 2
4	Cleaning school area	0 1 2
5	Removing garbage	0 1 2
6	Planting trees	0 1 2
7	Cleaning community latrines	0 1 2
-95	Other (specify _____)	0 1 2

G.29. When was the last time anyone from your household attended a Gram Sabha meeting?

[ 0 ] Never attended

[ 1 ] This week

[ 2 ] Past two weeks

[ 3 ] Within the last month

[ 4 ] Within the last 6 months

[ 5 ] Within the last year [ -95 ] Other (specify \_\_\_\_\_) [ -9 ] Don't know / not sure

G.30. Are your household members active in the following Associations / Committees / Groups? (**Do NOT prompt. Spontaneous response. Circle all that apply.**)

SN	Name of the Association/ committee/group	Existing and active in the Village? (0) No (1) Yes	Do your household' members participate in this committee? (0) No (1) Yes
1	Farmers Association/ Committee	0 1	0 1
2	Business groups	0 1	0 1
3	Cooperative Association/ Committee	0 1	0 1
4	Credit/finance group/SHG	0 1	0 1
5	Women's club	0 1	0 1
6	Youth Club	0 1	0 1
7	Water users' association (for irrigation)	0 1	0 1
8	Village Education Committee	0 1	0 1
9	Water and Sanitation Committee (VWSC)	0 1	0 1
10	GP	0 1	0 1
-95	Other (specify _____)	0 1	0 1

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G.31. **Who answered these questions?** [ 1 ] Head of Household [ 2 ] Primary Cook [ 3 ] Both

## H. UNDERSTANDING TIME PREFERENCES

H.1. How do you see yourself: are you generally a person who is patient or impatient? Please choose on a scale from 0 to 5, where the value 0 means: 'very patient' and the value 5 means: 'very impatient'.

[ 0 ] Very patient

[ 1 ] Mostly patient

[ 2 ] More patient than impatient

[ 3 ] More impatient than patient

[ 4 ] Mostly impatient

[ 5 ] Very impatient

[ -99 ] Refuse to answer (*Enumerator: probe once or twice*)

In daily life you make many decisions about how to spend and earn money. Some decisions concern the future. The future is uncertain, although sometimes we know if something is more or less uncertain and if something will happen in the near or distant future. We are trying to understand how people in this village make decisions when faced with a choice between an outcome in the near future compared to an outcome in the distant future. Suppose that someone offers you a gift of some money.

H.2. Imagine that the person giving you this gift offered you a choice: If you select option A, you will receive a payment of **Rs. 1,000 tomorrow**. If you select Option B, then you will receive **Rs. 2,000 after 12 months**. Imagine that there is absolutely no risk of not receiving any of the amounts in the future. There are no right or wrong choices regarding how you decide about the future. Which option would you chose?

[ 1 ] Option A (*Continue to next question*)

[ 2 ] Option B (*Skip to question H.4*)

[ -9 ] Uncertain (*Continue to next question*)

Now, we will ask you a series of questions that are similar to these options.

H.3. If you select option A, you will receive a payment of **Rs. 1,000 tomorrow**. If you select Option B, then you will receive **Rs. 2,500 after 12 months**. Which option would you choose? [ 1 ] Option A (*Skip to question H.5*)

[ 2 ] Option B (*Skip to question H.5*)

[ -9 ] Uncertain (*Continue to next question*)

H.4. If you select option A, you will receive a payment of **Rs. 1,000 tomorrow**. If you select Option B, then you will receive **Rs. 1,500 after 12 months**. Which option would you choose? [ 1 ] Option A

[ 2 ] Option B

[ -9 ] Uncertain

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## I. ENUMERATOR OBSERVATIONS

*Enumerator: Please thank the respondent for the interview. This section is to be filled only based on observation. Do not ask these questions.*

*First, go back to Question C.3 and indicate any persons on the household roster who observed the interview. Then fill in the following observations.*

I.1. Did anyone not on the household roster observe the interview? [ 0 ] No (*Skip to I.3*) [ 1 ] Yes

I.2. a. Approximately how many different people observed the interview? \_\_\_\_\_  
b. Did any of these people observe / help with the respondent during the conjoint exercise? [ 0 ] No [ 1 ] Yes

I.3. What is the main material of the walls of the house?

[ 1 ] Mud brick

[ 2 ] Metal

[ 3 ] Straw / hay

[ 4 ] Wood

[ 5 ] Stone / fired brick

[ 6 ] Cement / cinder block

[-95 ] Other, please specify: \_\_\_\_\_

**I.4. What is the main material used for the roof of the house?**

- [ 1 ] Metal
- [ 2 ] Straw / hay
- [ 3 ] Wood
- [ 4 ] Slate / shingles
- [ 5 ] Cement / cinder block
- [-95 ] Other, please specify: \_\_\_\_\_

**I.5. If observed, what is the main material used for the floor of the house?**

- [ 1 ] Mud
- [ 2 ] Tile
- [ 3 ] Stone / fired brick
- [ 4 ] Cement / cinder block
- [-95 ] Other, please specify: \_\_\_\_\_

**I.6. a. How would you rate the general comprehension of the survey questions by the respondent?**

- [ 1 ] Respondent understood everything well
- [ 2 ] Respondent understood most things well
- [ 3 ] Respondent understood some things well
- [ 4 ] Respondent understood few things well
- [ 5 ] Respondent understood almost nothing

**b. If 3-5 above, please indicate areas of particular difficulty** \_\_\_\_\_

**I.7. How would you rate the comprehension of the conjoint exercise by the respondent?**

- [ 1 ] Respondent understood the conjoint very well
- [ 2 ] Respondent understood the conjoint mostly well
- [ 3 ] Respondent understood the conjoint somewhat well
- [ 4 ] Respondent barely understood the conjoint
- [ 5 ] Respondent did not understand the conjoint at all

**I.8. In households that answer only “-9” to G.11 and G.14, please give your opinion about household:**

- [ 1 ] Very poor
- [ 2 ] Below average
- [ 3 ] Average
- [ 4 ] Above Average
- [ 5 ] Rich

H.5. How do you see yourself: are you generally a person who is fully prepared to take risks or generally avoid taking risks? Please choose on a scale from 0 to 5, where the value 0 means: 'not at all willing to take risks' and the value 5 means: 'very willing to take risks'."

- 0 ] Not at all willing to take risks
- 1 ] Rarely willing to take risks
- 2 ] Occasionally willing to take risks
- 3 ] Moderately willing to take risks
- 4 ] Generally willing to take risks
- 5 ] Very willing to take risks
- 99 ] Refused to answer (*Enumerator: probe once or twice*)

(After respondents finish these answers, ask the following questions.)

H.6. Imagine that the person giving you this gift offered you another kind of choice: Option A - you could *EITHER* have **Rs. 500 now** for sure *OR* Option B – we would flip a coin, if it **turned up heads** you would receive **Rs. 1,200 now** and if **turned up tails** you would receive **Rs. 0now**. There is no right or wrong choice regarding how you decide about these uncertain events. Which option would you choose?

- 1 ] Option A (*Continue to H.7*)
- 2 ] Option B (*Skip to H.8.*)
- 9 ] Uncertain (*Continue to H.7*)

H.7. Now consider another choice: Option A - you could *EITHER* have Rs. 500 now for sure *OR* Option B – we would flip a coin, if it turned up heads you would receive **Rs. 1,250 now** and if turned up tails you would receive Rs. 250 now. There is no right or wrong choice regarding how you decide about these uncertain events. Which option would you choose?

- 1 ] Option A (*Go to next section*)
- 2 ] Option B (*Go to next section*)
- 9 ] Uncertain (*Go to next section*)

H.8. Now consider another choice: Option A - you could *EITHER* have **Rs. 500 now** for sure *OR* Option B – we would flip a coin, if it turned up heads you would receive **Rs. 1,000 now** and if turned up tails you would receive **Rs. 0 now**. There is no right or wrong choice regarding how you decide about these uncertain events. Which option would you choose?

- 1 ] Option A
- 2 ] Option B
- 9 ] Uncertain

## Appendix C: Follow-up Survey

### COOKING BEHAVIORS IN RURAL INDIA

#### A. INTRODUCTION

**Supervisor, please read and ask for informed consent:** Greetings! My name is \_\_\_\_\_, and I am working for Chirag in Nanital and Duke University in North Carolina in the U.S.A. Chirag works for a varied number of development projects in villages in Uttrakhand. Duke University is a research university in the USA. Financial support for this study is from the US Agency for International Development. You are being asked to participate in a survey to support a research study on energy use in rural areas. We want to know something about your household – specifically about (1) your cooking practices (2) opinions and perceptions concerning your cooking conditions, (3) health status, (4) and socioeconomic variables. Interviews will be conducted with approximately 2,000 households drawn at random from a list provided by the India Census bureau. Your household was one of those selected to participate. If you decide to participate in this study, you will complete a 40 minute interview with a trained interviewer. Your participation in the study is completely voluntary. You may choose not to answer any question and you can stop your participation at any time. All information you provide will be kept confidential, that is, your name or other identification will not be associated with your answers to the questions. There is no direct, immediate, and tangible benefit of participating in this survey. However, in the long run many villages including yours can benefit from the improvements in the government policies. If you have any questions or concerns, please contact Geeta at +91 XXX.

A.1. **Supervisor only:** Are you willing to complete this interview and participate in this study?

[ 0 ] No (**Supervisor: Thank you for your time! Terminate the interview.**)

[ 1 ] Yes

A.2. Questionnaire No

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**INTERVIEW OUTCOME**

Number of Visit			
	1	2	Final Visit
A.5. Date	__/__/__ DD/MM/YY	__/__/__ DD/MM/YY	__/__/__ DD/MM/YY
A.6. Enumerator ID	___	___	___
A.7. Result*			
NO RETURN VISIT NEEDED (1) Completed (2) Refused (3) Partially completed, return visit not agreed to (4) People absent for extended period of time (5) Dwelling empty (6) Partially completed, return agreed (7) No eligible person present (8) Other: _____		RETURN VISIT INDICATED (9) Dwelling vacant or address not a dwelling ( <i>2<sup>nd</sup> round</i> ) (10) Dwelling destroyed ( <i>2<sup>nd</sup> round</i> ) (11) Dwelling not found ( <i>2<sup>nd</sup> round</i> ) (12) Dwelling occupied by family not interviewed in earlier round ( <i>2<sup>nd</sup> round</i> )	
A.8. If return visit indicated, enter date			
<b>FIELD</b>		<b>OFFICE</b>	
A.9. Interviewer Completed Date __/__/__	A.10. Field Supervisor Checked Date __/__/__	A.11. Study Supervisor Checked Date __/__/__	A.12. Data Entry Date __/__/__
<b>Person's ID</b>	<b>Person's ID</b>	<b>Person's ID</b>	<b>Person's ID</b>

(Pre-filled rosters with data from baseline)

P I D	C.1. Sub- family ID  (Use codes 1, 2, 3, etc to list membe rs from 1 <sup>st</sup> , 2 <sup>nd</sup> , an 3 <sup>rd</sup> subfam ily.)	C.2. Name all persons living in this household from the oldest to the youngest in each subfamily.  (Exclude visitors. Ask Q5, 7, 8 and record Q6 simultaneou sly.)	C.2,n. Is [NAME] still living here? [ 0 ] Has died [ 1 ] Yes [ 2 ] Left home [ 3 ] New member	C.3. <i>Return to this question to fill in at the end of the interview. Please circle the number "1" if this person responded to any question in the survey.</i>  (1) Yes	C.4. Sex  (Don't ask but observe in case of responde nt.)  (1) Male (2) Female	C.5. How old is [NAME]?			C.6. What is [NAME]'s relationship to the head of household? (1) Head (2) Wife/husband (3) Child/adopted child (4) Grandchild (5) Niece/nephew (6) Father/mother (7) Sister/brother (8) Son/daughter-in-law (9) Brother/sister-in-law (10) Grandfather/mother (11) Father/mother-in-law (12) Other relative (13) Servant or servant's relative (14) Tenant or tenant's relatives (-95) Other (specify _____)	C.7. What is the current marital status of [NAME]?	P I D
						Year s	Mon ths	Da ys			
1			0 1 2 3	1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	1
2			0 1 2 3	1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	2
3			0 1 2 3	1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	3
4			0 1 2 3	1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	4
5			0 1 2 3	1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	5
6			0 1 2 3	1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	6
7			0 1 2 3	1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	7
8			0 1 2 3	1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	8

9			0 1 2 3	1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	9
10			0 1 2 3	1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	10
11			0 1 2 3	1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	11
12			0 1 2 3	1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	12
13			0 1 2 3	1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	13
14			0 1 2 3	1	1 2				1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95	1 2 3 4 5 -9	14

**LOCATION INFORMATION**

A.17. Time Started:   :

A.18. Time Ended:

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A.22.a. *Can you show me your ration card? (Enumerator: observe card color. If respondent refuses, ask color)*

[ 0 ] No ration card

[ 1 ] Yellow

[ 2 ] Pink

[ 3 ] White

b. *Enumerator, did you have to prompt respondent with color of ration card?* [ 0 ] No [ 1 ] Yes

c. Are you below poverty line (BPL) or above poverty line (APL)?

[ 1 ] Below poverty line (BPL) (White or pink ration card)

[ 2 ] Above poverty line (APL) (yellow ration card)

[-9 ] Don't know / not sure

[-99 ] Refused to answer

A.23. *Enumerator, continue interview with the primary cook for the household. If the primary cook is not available, continue with the head of the household. Then record below:*

c. *Is the primary cook available?*

[ 0 ] No

[ 1 ] Yes, record name: \_\_\_\_\_

a-2.n. Can the primary cook read a newspaper?

[ 0 ] No

[ 1 ] Yes

- a-3.n. Can the primary cook maintain household accounts? [ 0 ] No [ 1 ] Yes
- d. Is the head of the household available?** [ 0 ] No [ 1 ] Yes, record name: \_\_\_\_\_
- b-2.n. Can the head of household read a newspaper? [ 0 ] No [ 1 ] Yes
- b-3.n. Can the head of household maintain household accounts? [ 0 ] No [ 1 ] Yes

A24.n. What is the distance from the household to the nearest market (where you can purchase groceries)?

- a. Minutes to travel to market (however household would travel) \_\_\_\_\_
- b. Kilometers to market \_\_\_\_\_

A25.n. What is the distance from the household to the nearest road where you could catch a bus?

- a. Minutes of travel to road (however household would travel) \_\_\_\_\_
- b. Kilometers to road \_\_\_\_\_

**Enumerator: Check A.4: If "1" is circled, ask Section B to the primary cook. If not available, ask Section B to head of household. If "2" is circled, ask Section B to the head of household. If not available, ask Section B to primary cook.**

## B. INFORMATION AND PERCEPTIONS

### Information on cookstoves and air pollution

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	[MESSAGE]	<p>B.1. Have you ever heard about how your cooking practices [MESSAGE]?</p> <p>[ 0 ] No (<i>Skip to next message</i>)</p> <p>[ 1 ] Yes (<i>Go to Q. B 2</i>)</p>	<p>B.2. From where did you hear about [MESSAGE]? (<b>Choose from below; circle all</b>)</p> <ol style="list-style-type: none"> <li>1. Posters / hoardings/wall paintings;</li> <li>2. TV advertisement;</li> <li>3. Radio advertisement;</li> <li>4. Aanganwadi, doctor, ANM &amp; other social workers ;</li> <li>5. School lessons &amp; teachers(including school going children);</li> <li>6. Film shows / exhibitions;</li> <li>7. Street plays / puppet shows, Local tales</li> <li>8. Family members &amp; friends;</li> <li>9. Leaflets / pamphlets /brochures;</li> </ol>	<p>B.3.n. What can you do to reduce these negative impacts? (<b>Choose from below; circle all. Do not prompt</b>).</p> <ol style="list-style-type: none"> <li>0. Nothing</li> <li>1. Keep children out of kitchen;</li> <li>2. Burn less firewood;</li> <li>3. Add chimney to stove</li> <li>4. Cook outside;</li> <li>5. Put ash and mud on vessel;</li> <li>6. Use cleaner stove;</li> <li>7. Use cleaner-burning fuels;</li> <li>8. Plant trees</li> <li>-9 Don't know / not sure</li> <li>-95 Other</li> </ol>
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			10. Newspaper & magazines; 11. Temple / mosque / church; 12. Self-help group meetings; 13. Realized by oneself 14. Someone from Chirag -95 Other	
1	Negatively impact your family's health – especially young children	0 1	1 2 3 4 5 6 7 8 9 10 11 12 13 - 95	0 1 2 3 4 5 6 7 8 -9 -95
2	Negatively impact local forests and watersheds	0 1	1 2 3 4 5 6 7 8 9 10 11 12 13 - 95	
3	Negatively impacts local air quality and climate change	0 1	1 2 3 4 5 6 7 8 9 10 11 12 13 - 95	

B.4. Have you heard of some stoves that produce less smoke than others? [ 0 ] No [ 1 ] Yes

B.5. Do you think some fuels produce less smoke than others? [ 0 ] No [ 1 ] Yes

**If Household Responded NO to both B4 and B5, skip to B7**

B.6a.n On a scale of 1 to 5, do you believe that your use of improved stoves and clean fuels can **improve your health**?

(1) No impact (3) Medium impact (5) Very large impact

(2) Small impact (4) Large impact

B.6b.n On a scale of 1 to 5, do you believe that your use of improved stoves and clean fuels can **improve the environment (like local forests)**?

(1) No impact (3) Medium impact (5) Very large impact

(2) Small impact (4) Large impact

B.6c.n On a scale of 1 to 5, do you believe that your use of improved stoves and clean fuels can **improve the air in your village**?

(1) No impact (3) Medium impact (5) Very large impact

(2) Small impact (4) Large impact



15n	Availability of fuel	1	2	1	2	1	2	1	2	1	2	1	2
16n	The work required to prepare fire before cooking	1	2	1	2	1	2	1	2	1	2	1	2
17n	Electrical shocks	1	2	1	2	1	2	1	2	1	2	1	2
18n	The ability to use electricity	1	2	1	2	1	2	1	2	1	2	1	2
19n	Cost of fuel or electricity bill	1	2	1	2	1	2	1	2	1	2	1	2
20	Other 1, specify:	1	2	1	2	1	2	1	2	1	2	1	2
21	Other 2, specify:	1	2	1	2	1	2	1	2	1	2	1	2

## PERCEPTIONS

I want you to think about the smoke that is generated by a traditional chulha. I want to play a game with you to understand what you think about this smoke and its effects on your health.

Here is a sheet of paper. On it I have drawn two circles, one is labeled safe, one is labeled not safe. And here are ten candies. I want you to place the candies in the two circles – safe or unsafe – according to how you think the smoke affects your health. For example, if you think the smoke is perfectly safe to breathe and has no negative effects on health, you will place all ten candies in the circle labeled “safe.” On the other hand, if you think this smoke is definitely not safe to breathe and will certainly make you sick, place all ten candies in the circle labeled “unsafe.” If you think there is an equal chance that this smoke will make you sick or not sick, you will put five candies in each circle. Or if you think there is slightly lower chance that you will get sick than not sick, you might place 7 or 8 candies in the safe circle.

Do you have any questions about this game? (*Enumerator, answer or clarify any questions that are asked*)

B.11. Now, please put the candies in the piles according to how you feel the smoke will affect your health. (*Enumerator, the number of candies placed in the “Safe” pile is indicated below.*)

- [ 0 ] Zero candies in safe pile
- [ 1 ] One candy in safe pile
- [ 2 ] Two candies in safe pile
- [ 3 ] Three candies in safe pile
- [ 4 ] Four candies in safe pile
- [ 5 ] Five candies in safe pile

- [ 6 ] Six candies in safe pile
- [ 7 ] Seven candies in safe pile
- [ 8 ] Eight candies in safe pile
- [ 9 ] Nine candies in safe pile
- [ 10 ] Ten candies in safe pile
- [ -99 ] Refused to answer (*Enumerator: probe once or twice*)

B.12. *Who answered these questions?* [ 1 ] Head of Household [ 2 ] Primary Cook [ 3 ] Both

## E. HOUSING, COOKING, AND FUEL

Enumerator: Ask Section E to primary cook

### STOVE CHARACTERISTICS AND USE

SID	Stove Types –  <b>Ask ONLY for stoves used for cooking</b>	E.1.n. Do you own [TYPE]  [0] No ( <i>Go to next stove option</i> )  [1] Yes ( <i>Continue across</i> )	E.2. How many of [TYPE] do you own?  <i>Write number</i>	E.2b.n. What is your primary stove?  <i>Write 1 in row for primary stove</i>	E.3. How is this stove ventilated? <b>(circle all; Enumerator please look)</b> [ 0 ] None [ 1 ] Windows [ 2 ] Openings in wall (hole) or raised roof [ 3 ] Chimney [ 4 ] Fan [ 5 ] Door to outside [ -9 ] Don't know / not sure	E.4. How many burners does this stove have?  [ 1 ] One [ 2 ] Two [ 3 ] Three [ 4 ] More than three	E.5. How long have you had [STOVE]?  <i>Write # of years. If less than 1 year, write &lt;1.If always used, write Always.</i>	E.6. Has this stove been used in the past week?  [ 0 ] No <b>Go to E7</b> [ 1 ] Yes <b>Skip to E8</b>	E.7. Why is it not used in past week?  [ 0 ] Stove not needed [ 1 ] Broken [ 2 ] Under construction [ 3 ] Heat from stove [ 4 ] No fuel [ -95 ] Other	E.8. How often do you use this [STOVE]?  [ 1 ] Daily [ 2 ] Few times per week (3-4 times) [ 3 ] Rarely
[1]	Mittikachula / Traditional anjeti stove	0 1			0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 - 95	1 2 3
[3]	Traditional 3 stone stove	0 1			0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 - 95	1 2 3
[4]	Kerosene stove	0 1			0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 - 95	1 2 3
[6]	LPG-Stove	0 1			0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 - 95	1 2 3
[7a.n]	Electric – electric heater	0 1			0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 - 95	1 2 3
[7b.n]	Electric – G Coil only	0 1			0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 - 95	1 2 3
[8]	Biogas/Gobar	0 1			0 1 2 3 4 5 -9	1 2 3 4		0 1	0 1 2 3 4 - 95	1 2 3



[1]	Mittikachula / Traditional anjeti stove				0 1 2 3 4 5 6 7 -95	0 1							
[3]	Traditional 3 stone stove				0 1 2 3 4 5 6 7 -95	0 1							
[4]	Kerosene stove				0 1 2 3 4 5 6 7 -95	0 1							
[6]	LPG-Stove				0 1 2 3 4 5 6 7 -95	0 1							
[7a.n ]	Electric – electric heater				0 1 2 3 4 5 6 7 -95	0 1							
[7b.n ]	Electric – G Coil only				0 1 2 3 4 5 6 7 -95	0 1							
[8]	Biogas/Gobar Gas				0 1 2 3 4 5 6 7 -95	0 1							
[9]	Cast iron Biomass stove (Sagarh)				0 1 2 3 4 5 6 7 -95	0 1							
[11a.n ]	Greenway Smart Stove				0 1 2 3 4 5 6 7 -95	0 1							
[11b.n ]	Other Commercial “improved” cook stove (e.g. block office)				0 1 2 3 4 5 6 7 -95	0 1							
[12]	Others (specify)				0 1 2 3 4 5 6 7 -95	0 1							

SID	Stove Types	E.13a. Where is this stove located ( <i>circle all; Enumerator please look</i> )? [ 1 ] Inside the house with no partition (kitchen and living rooms same) [ 2 ] Inside the house with partition (kitchen and living rooms same) [ 3 ] Inside the house with separate room (kitchen and living rooms different) [ 4 ] Attached room outside the house but separate entrance [ 5 ] Outside the house in a stand- alone room [ 6 ] Outside the house on the veranda (underneath roof overhang) [ 7 ] Outside the house; open air [ 8 ] Inside the house, in the courtyard	E.13b.n. Do you cook with the stove in different places?  [0] No  [1] Yes: stove is moved sometimes to cook in different places	E.14. <i>Observe: Does the stove look like it has been used recently? (e.g. Signs of ash, warm stove, stove currently in use, etc.)</i>  (0) No (1) Yes (-88) Observation not possible	E.15. <i>Observe: Do you see significant black soot on the wall behind the stove or the ceiling?</i>  [ 0 ] No [ 1 ] Wall is black is soot [ 2 ] Ceiling is black with soot [-88] Observation not possible
[1]	Mittikachula / Traditional anjeti stove	1 2 3 4 5 6 7	0 1	0 1 -88	0 1 2 -88
[3]	Traditional 3 stone stove	1 2 3 4 5 6 7	0 1	0 1 -88	0 1 2 -88
[4]	Kerosene stove	1 2 3 4 5 6 7	0 1	0 1 -88	0 1 2 -88
[6]	LPG-Stove	1 2 3 4 5 6 7	0 1	0 1 -88	0 1 2 -88
[7a.n]	Electric – electric heater	1 2 3 4 5 6 7	0 1	0 1 -88	0 1 2 -88
[7b.n]	Electric – G Coil only	1 2 3 4 5 6 7	0 1	0 1 -88	0 1 2 -88
[8]	Biogas/Gobar Gas	1 2 3 4 5 6 7	0 1	0 1 -88	0 1 2 -88
[9]	Cast iron Biomass stove (Sagarh)	1 2 3 4 5 6 7	0 1	0 1 -88	0 1 2 -88
[11a.n]	Greenway Smart Stove	1 2 3 4 5 6 7	0 1	0 1 -88	0 1 2 -88
[11b.n]	Other Commercial “improved” cook stove (e.g. block office)	1 2 3 4 5 6 7	0 1	0 1 -88	0 1 2 -88
[12]	Others (specify)	1 2 3 4 5 6 7	0 1	0 1 -88	0 1 2 -88

E.16. Do you burn waste? (*Multiple answers possible; circle all that apply*):

[ 0 ] Do not burn waste

[ 1 ] Indoors

[ 2 ] Outdoors near house

[ 3 ] Outdoors in community dump

[-95] Other (Specify: \_\_\_\_\_)

[-9] Don't know/ Not sure

E.17. Do you burn agricultural waste in the field?  
 [ 0 ] No [ 1 ] Yes

**FUELS USED**

FI D	Cooking fuel	E.18. Do you use [FUE L]?  <i>Circle all</i>  [0] No [1] Yes	E.19. <i>Ask and observe:</i> Do you have any of this fuel in the house at this time?		E.20. How regularl y do you use it?  [ 1 ] Daily [ 2 ] Few times a week [ 3 ] Rarely	E.21.n. How much money do you spend on this fuel? <i>In Rs. (If all of this fuel is collected by hh, write "0", reported in years or weeks, please indicate it)</i>		E.22. How long does it take you to <u>prepare the fuel</u> every day, not including collection time? (chopping wood, adding dung to gobar gas plant, etc.)		E.23. Who in the househol d collects this fuel? <i>(Please indicate below all persons from the househo ld roster who collect wood (Write all PID)</i>	E.24.n. How much time does your household spend <u>collecting or bringing this fuel home</u> in a typical day / week / month (hrs)  <i>(Record number of hours; circle unit for period reported)</i>		E.25.n. How much of this fuel do you use on average?  <i>(Unit per day/ week/ month) For example, one cylinder of LPG lasts 3 months, write "Cylinder" for unit; "1/3" for amount; and "[3]" for time period.</i>			E.25b.n.  <b>FUEL WEIGHING</b> <i>(Please ask household to bring any solid fuel it will use in next 24 hrs and weigh it. Explain that they must be sure to bring more fuel than they expect they will need for the next 24 hours. We will weigh whatever fuel is left 24 hours later.)</i>		E.25c.n. <b>RETURN VISIT</b> <i>If ending weight is zero, ask: How much extra fuel of [TYPE] did you use? [ 0 ] No extra fuel [ 1 ] Less than one quarter of the original amount [ 2 ] Less than half of the original amount [ 3 ] More than half, but less than the full original amount [ 4 ] About the same as the original amount</i>
			Have fuel ?	Obser -ved?		Rs	Per (unit)	Minu tes per day	Hour s per day	Indicate all PIDs	Hrs	Time perio d	Num ber of Unit	Unit	Per (Time period) [1] day [2] week [3] month	Starting Weight (kgs)	Endi ng weig ht (kgs)	
1	Firewood	0 1	0 1	0 1	1 2 3		Week					Per Week		Kgs	1 2 3			0 1 2 3 4
2	Crop residues, twigs	0 1	0 1	0 1	1 2 3		Week					Per Week		Kgs	1 2 3			0 1 2 3 4

3	Leaves	0 1	0 1	0 1	1 2 3		Week					Per Week		Kgs	1 2 3			0 1 2 3 4
4	Dung cakes	0 1	0 1	0 1	1 2 3		Week					Per Week		Pieces	1 2 3			0 1 2 3 4
5	Biomass pellets	0 1	0 1	0 1	1 2 3		Week					Per Week		Kgs	1 2 3			0 1 2 3 4
6	Kerosene	0 1	0 1	0 1	1 2 3		Month					Per month		Liters	1 2 3			
7	LPG	0 1	0 1	0 1	1 2 3		Per cylinder (14kg)					Per Month		Cylinder 14 kgs	1 2 3			
8	Electricity	0 1	0 1	0 1	1 2 3		2 months							Elec. Units	2 months			
9	Biogas	0 1	0 1	0 1	1 2 3		Week					Per week		Kgs dung	1 2 3			
10	Other (Specify _____)	0 1	0 1	0 1	1 2 3							_____			1 2 3			0 1 2 3 4

E-K.9. Did the household cook the same number of meals as usual? [ 0 ] No, more than usual [ 1 ] No, fewer than usual [ 2 ] Yes, same as usual

E-K.10. Did the household follow a normal routine with its cooking today? [ 0 ] No - What was different? (weddings, holiday, etc) \_\_\_\_\_ [ 1 ] Yes

[STOVE] <b>ONLY DURING PAST 24 HOURS</b>	E-K.11. What stoves did you use during the monitoring period? <b>(Circle all)</b> [0] No ( <i>Next stove</i> ) [1] Yes ( <i>Continue</i> )	E-K.12. How much of the total firewood did you use in each stove?	E-K.13. How much of the total biomass pellets did you use in each stove?	E-K.14. How much of the total dung cakes did you use in each stove?	E-K.15. How much of the crop residue / leaves did you use in each stove?	E-K.16. For how much time was the stove used <b>for COOKING only</b> in this period?	E-K.17. For how much time was the stove used <b>for HEAT</b> (to keep household warm or to heat water for bathing) in this period?
						Hrs (HH)   Mins (MM)	Hrs (HH)   Mins (MM)

1	Mitti ka chula – Single	0 1								
3	Multiple Pot / Traditional anjeti									
4	Traditional 3 stone stove	0 1								
6	Kerosene	0 1								
7a, n	Electric	0 1								
7b, n	<b>G-Coil Stove</b>	0 1								
8	Biogas / Gobar gas	0 1								
9	Cast iron stove / Sagarh	0 1								
11a	<b>Greenway Smart Stove</b>	0 1								
11b	Other Improved biomass (e.g. from block office)	0 1								
95	Other, specify _____	0 1								
T	Total ( <i>Fuels sum should = 100%</i> )		<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>				

E.26. If you were to buy the following fuels in the market, what price would you pay? (*Enumerator: Record the price the respondent says he/she would actually pay, for example if the fuel is only available on the black market*)

- e. Firewood: \_\_\_\_\_ Rs/quintal (1 quintal = 100 kg) [ -9 ] Don't know/ Not sure
- f. Dung cakes: \_\_\_\_\_ Rs/patty [ -9 ] Don't know/ Not sure
- g. LPG: \_\_\_\_\_ Rs/cylinder (1 cylinder = 14.2kg) [ -9 ] Don't know/ Not sure
- h. Kerosene: \_\_\_\_\_ Rs/cylinder (1 cylinder = 14.2kg) [ -9 ] Don't know/ Not sure

E.27. Are any of the women in this household member of a women's club / self-help group (SHG)?

- [ 0 ] No – not a member
- [ -98 ] No - no women's club or SHG in village (*Skip to next section*)
- [ 1 ] Yes

E.28. What are the responsibilities of members of women's club / SHGs in this village? (*Circle all that apply*)

- [ 1 ] Attend group meetings
- [ 2 ] Save the amount agreed upon with other members
- [ 3 ] Taking loan from bank
- [ 4 ] Giving small loans to each other
- [ 5 ] Pay penalty in case of non-attendance or defaulting in loan repayment
- [-95] Others (Specify \_\_\_\_\_)
- [ -9 ] Don't know/ Not sure

E.29. Why did or didn't you (or other women in the household) become a member of the women's club / SHG? (*Circle all that apply*)

- [ 1 ] Membership fee
- [ 2 ] All female villagers were becoming members
- [ 3 ] Financial benefits to members
- [ 4 ] Level of functionality of the SHG/Women's club
- [ 5 ] Time required for club
- [-95] Others (Specify \_\_\_\_\_)

## F. SATISFACTION WITH IMPROVED STOVES

Enumerator: Ask Section F to primary decision maker, preferably also with primary cook present.

or: Unless otherwise stated, use [ 1 ] Yes [-9] Don't know	Greenway	G-Coil
F.1.n. Have you heard of this improved stove? <i>If No, skip to F.19a.</i>	0 1 -9	0 1 -9
F.2.n. Where did you hear about this improved stove? ( <i>Circle all</i> ) (1) Someone from Chirag (salesperson or Karyakarta) (2) Neighbor / friend / relative (3) Chirag cooperative – Pragiti (4) Local market (-95) Other : _____ (-9) Don't know	1 2 3 4 -9 -95	1 2 3 4 -9 -95
F.3.n. Did anyone in this household observe a HOUSEHOLD demonstration of the stove?	0 1 -9	0 1 -9
F.4.n. Did anyone in this household observe a GROUP / COMMUNITY demonstration of the stove?	0 1 -9	0 1 -9
F.5.n. Have you seen a promotional flyer about this improved stoves?	0 1 -9	0 1 -9
F.6.n. Can you please tell me all of the things you remember from this flyer? It showed ( <b>Enumerator: Please circle all answers given</b> ) (1) Stove types (2) Stove fuel use (consumption) (3) Stove cooking time (4) Stove smoke production (5) Stove electricity requirement (6) Stove price (7) Stove installment plan (-95) Other _____ (-9) Don't know	1 2 3 4 5 6 7 -95 -9	
F.7.n. Did someone from Chirag come to this household to talk to you about purchasing this improved stove? [ 0 ] No <b>SKIP TO F.19a</b> [ 1 ] Yes [-9] Don't know	0 1 -9	0 1 -9
F.8.n. What rebate / chit amount did your household draw during this first visit? [ 0 ] We did not receive a rebate chit [ 1 ] 25 Rupees [ 2 ] 200 Rupees [ 3 ] 1 installment [-9] Don't know	0 1 2 3 -9	0 1 2 3 -9

F.9.n. Did you buy this stove? [ 0 ] No <b>SKIP TO F.19a</b> [ 1 ] Yes   [-9] Don't know <b>SKIP TO F.19a</b>	0 1 -9	0 1 -9
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***Only for Households that purchased a stove:***

<i>Enumerator: Unless otherwise stated, use [ 0 ] No [ 1 ] Yes [-9] Don't know</i>	<b>Greenway</b>	<b>G-Coil</b>
F.10.n. Did you pay in installments or all up front? [ 1 ] Installments [ 2 ] All up front	1 2	1 2
F.11.n. How many times did stove sales staff from Chirag visit your household? ( <i>Write #</i> )	<input type="text"/>	
F.12.n. How often did stove sales staff from Chirag return to your household? [ 0 ] Only once; never returned [ 1 ] Every week                      [ 4 ] Every month [ 2 ] Every 2 weeks                  [ -9 ] Don't know [ 3 ] Every three weeks              [ -95 ] Other	0 1 2 3 4 -9 -95	
F.13.n. Did your household actually receive the rebate amount at the end of the program?	0 1 -9	0 1 -9
F.14.n. On a scale of 1 to 5, how do you feel about the purchase? [ 1 ] - Very unhappy [ 2 ] - Unhappy [ 3 ] - Not unhappy [ 4 ] - Happy [ 5 ] - Very happy	1 2 3 4 5	
F.15.n. Do you regret purchasing this stove?	0 1 -9	0 1 -9
F.16.n. Have you had any problems with the stove? ( <i>Do not prompt</i> )	[ 0 ] None [ 1 ] Chopping up wood was inconvenient [ 2 ] Handles broken [ 3 ] Discoloration [ 4 ] Hard to light [ 5 ] Smoke	[ 0 ] None [ 1 ] Shocks [ 2 ] Problem with coil [ 3 ] Problem with plug or wire [ 4 ] Problem with knob [ 5 ] Stove not heating enough

	[-95] Other _____	[ 6 ] Light fluctuation in household/electricity bill [-95] Other _____
F.17.n. Did you try to get maintenance for this stove? [ 0 ] No [ 1 ] Yes; called helpline [ 2 ] Yes; told/called Chirag sales people [ 3 ] Yes; took stove to mechanic [ 4 ] Yes; called Bobby                      [-9] Don't know    [-95] Other	0 1 2 3 4 -95	0 1 2 3 4 -95
F.18.n. What would you change about this stove sales program in the future? ( <b>Do not prompt; circle all</b> ) [ 0 ] Nothing – program was good [ 1 ] More installments [ 2 ] Visits to provide stove maintenance [ 3 ] Better demonstrations of stove [ 4 ] Better descriptions of stove benefits [ 5 ] Change the stoves that are offered [ 6 ] More time between installments                      [-9] Don't know    [-95] Other _____	0 1 2 3 4 5 6 -9 -95	

**Ask All households:**

<b>Enumerator: Unless otherwise stated, use</b> [ 0 ] No    [ 1 ] Yes    [-9] Don't know	<b>Greenway</b>	<del><b>G-Coil</b></del>
F.19a.n. <b>Ask for everyone, even if household already purchased on Greenway stove:</b> The Greenway stove is an improved stove that requires less fuel and burns more cleanly. ( <b>Enumerator: show information sheet from promotion and explain stove features</b> ) Would you have any interest in purchasing this stove at this time? ( <b>Enumerator: We are gathering these responses only to gauge interest in stoves for future projects; no stoves are available at this time</b> ) [ 0 ] No                                      [ 1 ] Yes <b>SKIP TO F.20a</b> [-9] Don't know	0 1 -9	
F.19b.n. Why would you not be interested? [ 0 ] No interest / Stove not needed [ 1 ] Not enough money [ 2 ] The stove is not attractive to me	0 1 2 -95	

[ -95 ] Other: _____		
<p>F.20a.n. <i>Ask for everyone, even if household already purchased on G-coil stove:</i> The G-coil stove is an improved stove that runs on electricity, not biomass fuel. <i>(Enumerator: show information sheet from promotion and explain stove features)</i> Would you have any interest in purchasing this stove at this time? <i>(Enumerator: We are gathering these responses only to gauge interest in stoves for future projects; no stoves are available at this time)</i></p> <p>[ 0 ] No [ 1 ] Yes <b>SKIP TO F.21</b> [-9]</p> <p>Don't know</p>	X	0 1 -9
<p>F.20b.n. Why would you not be interested?</p> <p>[ 0 ] No interest / Stove not needed  [ 1 ] Not enough money  [ 2 ] Electricity bill will be too high  [ 3 ] The stove is not attractive to me  [ 4 ] Concerns about shocking / electricity  [ -95 ] Other: _____</p>	X	0 1 2 3 4 -95

F.21.n. *Who answered these questions?* [ 1 ] Head of Household [ 2 ] Primary Cook [ 3 ] Both

## G. SOCIOECONOMIC CHARACTERISTICS

*Ask these questions to the head of household. If this person is unavailable, ask the primary cook.*

G.1. How many rooms are there in your house?

- d. Number of rooms used for sleeping and living by your household: \_\_\_\_\_
- e. Separate rooms used for livestock or storage? [ 0 ] No [ 1 ] Yes
- f. Number of total rooms: \_\_\_\_\_

G.2. Does your family own this house? [ 0 ] No (**Go to G.4**)  
[ 1 ] Yes

G.3. What do you think would be the market value of your house today?

- a. House only: Rupees: \_\_\_\_\_ [ -9 ] Don't know / Not sure
- b. Plot (land) only: Rupees: \_\_\_\_\_ [ -9 ] Don't know / Not sure
- c. Total (house and land): Rupees: \_\_\_\_\_ [ -9 ] Don't know / Not sure

G.4. **Only for renter:** How many rooms do you rent and how much do you pay each month for rent?

b. Number of rooms: \_\_\_\_\_

b. Rupees per month: \_\_\_\_\_

G.5. Does your household own or lease any agricultural lands?

- [ 0 ] Neither (**Go to G.7**)
- [ 1 ] Own only
- [ 2 ] Lease only
- [ 3 ] Own and Lease

G.6. How much land does your household own or lease? (**Record -9 if respondent does not know the answer or is not sure**)

Status	A. Area	B. Unit						
		(1) Acres	(2) Guntha	(3) Hectares	(4) Square feet	(5) Bigha	(6) Naali	(-95) Other (specify _____)
Owned		1	2	3	4	5	6	-95
Leased		1	2	3	4	5	6	-95

G.7. What is your main water source?

- [ 1 ] In yard or in house tap
- [ 3 ] Private dug-well
- [ 5 ] Public dug well
- [ 7 ] Neighbors that give water away
- [ 9 ] Tanker/vendor
- [ 11 ] Rainwater or water harvesting tank
- [ 2 ] Public tap/standpost
- [ 4 ] Private bore well/handpump
- [ 6 ] Public bore well/hand pump
- [ 8 ] Other surface water / spring water diversion
- [ 10 ] Commercial/ retail water purification center
- [ 12 ] Spring

G.8. What is your main sanitation facility?

- [ 1 ] No facility – open defecation
- [ 3 ] Community toilet
- [ 2 ] Private latrine
- [ 4 ] Neighbor's toilet

G.9. What is the main source of lighting in your home?

- [ 1 ] Electricity
- [ 2 ] Kerosene lamp
- [ 3 ] Lantern
- [ 4 ] Petromax lamp
- [ -95 ] Other (specify \_\_\_\_\_)
- [ -9 ] Don't know / not sure

G.10a. Do you have electricity?

- [ 1 ] Yes, all the time

[ 2 ] Yes, sometimes (*Enumerator, ask the average number of hours of electricity per day received by the household: \_\_\_\_\_ hrs/day*)  
 [ 3 ] No *Skip to Q G.10c.*

G.10b.n. Do you have a copy of your most recent electricity bill? [ 0 ] No [1]Yes

G.10c.n. *If yes, ask to view and record from the electricity bill. If no, ask:*

- 1) Number of units of electricity consumed: \_\_\_\_\_
- 2) Bill amount \_\_\_\_\_
- 3) Bill period [ 1 ] 1 month [ 2 ] 2 months

**Assets**

G.11. How many of the following assets does your household currently own?

AID	Asset / consumer durables	How many [ASSET] do you own? (-9) Don't know/not sure
1	Refrigerator	
2	Sewing/knitting machine	
3	Generator (electricity / power)	
4	Electric Fan	
5	Television	
6	Bicycle	
7	Motorcycle/scooter/moped	
8	Car or truck	
9	Cellphone	
10	Mosquito Net	
11	Pressure Cooker	
12	Cots	
13n	Jewelry	Rs.

LIVESTOCK		
14n	Cows	
15n	Oxen	
16n	Water buffalo	
17n	Sheep	
18n	Goats	
19n	Pigs	
20n	Chickens	

### Income

G.12. Imagine a stairway with 6 steps. On the bottom step (step 1), we have the poorest people in this community; on the highest step (step 6), we have the richest people. On which step would you say you are now? (**Circle One**)

[ 1 2 3 4 5 6 ]

[ -99 ] Refused to answer (**Enumerator: probe once or twice**)

G.13. On which step do you think you will be in 4 years?

[ 1 2 3 4 5 6 ]

[ -99 ] Refused to answer (**Enumerator: probe once**)

### Consumption

G.14.n. Now I want to ask about total consumption of the household. Please exclude from your answer any items purchased for processing or resale in a household enterprise. About how much money does your household spend on...? **Enumerator: Either answer Quantity and Price per unit, OR answer Average month**

Consumption category	Q uantity	P rice per unit	O wn production? (1) Yes	A verage month (Rs. / month)
m. Food (Total estimated)	<del> </del>	<del> </del>	1	
n. Beverages			1	

o. Meat and eggs			1	
p. Milk and milk products			1	
q. Cooking fuel			1	
r. Electricity			1	
s. Health expenses			1	
t. Education			1	
u. Mobile phone			1	
v. Liquor and tobacco			1	
w. Other major expenses			1	
x. Total (estimated)			1	

### SAFETY NETS

G.15. Has your household faced any serious burden or crisis?

- [ 1 ] Within last 2 weeks  
 [ 2 ] Within last month  
 [ 3 ] Within last 6 months  
 [ 4 ] Within last year  
 [ 5 ] Within last 6 years  
 [ 6 ] Not in the last 6 years (*Go to G.18*)  
 [ -9 ] Don't know / not sure (*Go to G.18*)

G.16. What type? (*Circle all that apply. Do NOT prompt. Spontaneous response.*)

SN	Burden/Crisis	(1) Yes
1	Major illness, disease or death in the family	1
2	Crop or livestock disease	1
3	Hardships because of floods	1
4	Hardships because of droughts	1
5	Unexpected social or religious event (wedding, funeral, other event)	1
6	Loss of job (e.g., shut-down of local employer),	1
7	Loss of livestock or other assets due to theft or natural causes	1
8	Super cyclone	1

-95	Other (specify _____ )	1
-----	------------------------	---

G.17. What did you do (are you doing) to deal with this situation? (*Circle all that apply. Do NOT prompt. Spontaneous response.*)

SN	Coping Actions	(1) Yes
1	Relied on government assistance	1
2	Used remittances	1
3	Taken a loan	1
4	Sold off assets	1
5	Used personal savings	1
6	Work for wages	1
7	Earn extra income	1
8	Contributions by village/community members	1
-95	Other (specify _____ )	1

G.18. In the past or currently has your household received any assistance for under any public scheme? Few example include: Integrated Rural Development Programme (IRDP); National Rural Employment Programme (NREP); Training Rural Youth For Self Employment (TRYSEM); Development of Women and Children of Rural Areas (DWARCA); Indira AwasYojana (IAY); Sanjay Gandhi NiradharYojana (SGNY); Employment Guarantee Scheme (EGS)

SN	Assistance type	a. Received in the past? 0) No (1) Yes (-9) Don't know / not sure	b. Currently receiving? (0) No (1) Yes (-9) Don't know / not sure
1	Water	0 1 -9	0 1 -9
2	LPG	0 1 -9	0 1 -9
3	Kerosene	0 1 -9	0 1 -9
4	Sanitation	0 1 -9	0 1 -9
5	Food and Nutrition	0 1 -9	0 1 -9
6	Education	0 1 -9	0 1 -9
7	Old age security	0 1 -9	0 1 -9
8	Employment	0 1 -9	0 1 -9
9	Housing and home improvement	0 1 -9	0 1 -9
10	Health care	0 1 -9	0 1 -9
11	Training	0 1 -9	0 1 -9

SN	Assistance type	a. Received in the past? 0) No (1) Yes (-9) Don't know / not sure	b. Currently receiving? (0) No (1) Yes (-9) Don't know / not sure
12	Child development	0 1 -9	0 1 -9
13	Disability or death benefit (widows)	0 1 -9	0 1 -9
14	Pregnancy benefit	0 1 -9	0 1 -9
-95	Other (specify _____)	0 1 -9	0 1 -9

**CREDIT**

N	Sources of Credit in this Neighborhood or Locality.	G.19. Has your household taken a loan from [SOURCE] in the last year? (0) No ( <i>Go to next SOURCE</i> ) (1) Yes (-9) Don't know / not sure ( <i>Go to next SOURCE</i> )	G.20. How much did your household borrow (principal amount) from [SOURCE] in the last year?  <i>(record the data for the most recent loan)</i> (-9) Don't know / not sure	G.21. What is the repayment period for this loan?  <i>(record the data for the most recent loan)</i>  (-9) Don't know / not sure		G.22. What was the interest rate for this loan?  (-9) Don't know / not sure ( <i>Go to next SOURCE</i> )	
				Rupees	M onths	Ye ars	Perc ent/ month
	DWARCA, SHG, Chit Funds, ROSCAS, or other small loan giving group (Micro Finance)	0 1 -9					
	Family or friends	0 1 -9					
	Agricultural Co-	0 1 -9					

	operative						
	Money lender, Employer Landlord	0 1 -9					
	Commercial Bank (e.g., ICICI Bank) or Grameen or Rural Bank	0 1 -9					
95	Other _____	0 1 -9					

### SAVINGS

110

SN	Savings in this Neighborhood or Locality.	G.23. Is it possible for households in this village to save money at [SOURCE] now? <i>(Prompt: for all SOURCE)</i> (0) No <i>(Go to next SOURCE)</i> (1) Yes (-9) Don't know / not sure <i>(Go to next SOURCE)</i>	G.24. Has your household saved money at [SOURCE] in the last year? (0) No <i>(Go to next SOURCE)</i> (1) Yes (-9) Don't know / not sure <i>(Go to next SOURCE)</i>	G.25. How much did your household save at [SOURCE]?	G.26. How much interest do these savings earn?	
				(-9) Don't know / not sure <i>(Go to next SOURCE)</i> Rupees	(-9) Don't know / not sure <i>(Go to next SOURCE)</i> Percent per month	Percent per year
1	DWARCA, SHG, Chit Funds, ROSCAS, or other small loan giving group (Micro Finance)	0 1 -9	0 1 -9			
2	Commercial/Nationalized Bank (e.g., SBI, Andhra Bank, ICICI Bank), Grameen or Rural Bank, Post Office	0 1 -9	0 1 -9			
-95	Other _____	0 1 -9	0 1 -9			

## COMMUNITY PARTICIPATION

G.27. Do you or any members of your household participate in any activities for cleaning your neighborhood and community (outside the immediate limits of your house)

[ 0 ] No (**Go to G.29**)

[ 1 ] Yes

G.28. Please list all village-cleaning activities for community welfare household members participated in. (*Spontaneous response. Note in the table*). For each of the activities mentioned by you, was this a one-time activity or a repetitive activity?

N	Activities	Frequency of participation		
		(0) Never	(1) One time	(2) Repetitive
	Sweeping streets	0	1	2
	Cleaning drains	0	1	2
	Cleaning water sources	0	1	2
	Cleaning school area	0	1	2
	Removing garbage	0	1	2
	Planting trees	0	1	2
	Cleaning community latrines	0	1	2
95	Other (specify _____)	0	1	2

G.29. When was the last time anyone from your household attended a Gram Sabha meeting?

[ 0 ] Never attended

[ 1 ] This week

[ 2 ] Past two weeks

[ 3 ] Within the last month

[ 4 ] Within the last 6 months

[ 5 ] Within the last year

[ -95 ] Other (specify \_\_\_\_\_)

[ -9 ] Don't know / not sure

SN	Name of the Association/ committee/group	G.30_1. Existing and active in the Village? ( <i>Read options. Circle all that apply.</i> ) (0) No (1) Yes	G.30_2. Do your household' members participate in this committee? (0) No (1) Yes
1	Farmers Association/ Committee	0 1	0 1
2	Business groups	0 1	0 1
3	Cooperative Association/ Committee	0 1	0 1

4	Credit/finance group/SHG	0	1	0	1
5	Women's club	0	1	0	1
6	Youth Club	0	1	0	1
7	Water users' association (for irrigation)	0	1	0	1
8	Village Education Committee	0	1	0	1
9	Water and Sanitation Committee (VWSC)	0	1	0	1
10	GP	0	1	0	1
11	Forest User Group				
-95	Other (specify _____)	0	1	0	1

G.31. *Who answered these questions?* [ 1 ] Head of Household [ 2 ] Primary Cook [ 3 ] Bot

## C. FAMILY ROSTER AND SOCIO DEMOGRAPHICS

*Enumerator, Ask primary cook the following questions. If the primary cook is unavailable, as the head of household.*

I D	C.8. Who is / are the: (1) Primary cook? (2) Secondary cook(s)? (cooks at least once a week)  {write #1 against the name of the primary cook, and #2 against the name of any other secondary cook(s)}	C.9. What is [NAME]'s main work? <i>Note, work is described as activity that earns income and maintains livelihood.</i> (1) Not employed, not looking for work (2) Not employed, looking for work (3) Agricultural laborer on own farm only (4) Agricultural laborer on others' farms (5) Non-farm work as day labor (6) Non-farm work as construction or factory worker (7) Non-farm work as skilled artisan (8) Self-employed (non-agricultural) (9) Government employee (including Panchayat staff)	C.10.a.n. How much would [NAME] earn if he/she were to work for one day <i>regardless of employment status. Only ask for people older than 5.</i> <i>(Enumerator: Write "0" if [NAME] would not be able to earn anything)</i> <i>Circle 1 for daily, 2 for monthly, 3 for yearly</i>		C10.b.n Does [NAME] smoke?  (0) No ( <i>Skip to C.13</i> ) (1) Yes, cigarettes (2) Yes, other products	C10.c.n. <i>If yes to C.11, ask:</i> How often does [NAME] smoke?  (1) Several times each day (2) 1x per day (3) Several times per week (4) Not more than 1x per week	C.11 <i>Ask if older than 4 years old</i> Is [NAME] currently enrolled or attended school? (0) Never attended school ( <i>Skip</i> )	C.12. <i>Ask if older than 4 years old</i> How many years of education has [NAME] completed?  ( <i>Do not include Aanganwadi / kindergarten. People may report standard they have passed. Standard is same as number of year.</i> )	I D
			Rupees	(1) Daily (2) Monthly (3) Yearly					

		(10) Employee of private firm / business (11) Professional (lawyer, doctor, nurse, teacher, angawadi, etc.) (12) Student (13) Housework (14) Unable to work(too old, ntoo young to work, handicapped) (-95) Other (specify_____)					<i>next question</i> (1) Attended but not now (2) Currently enrolled (-9) Don't know / not sure		
		1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95		2 3	1 2 0	2 3 4 1	1 2 -9		
		1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95		2 3	1 2 0	2 3 4 1	1 2 -9		
		1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95		2 3	1 2 0	2 3 4 1	1 2 -9		
		1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95		2 3	1 2 0	2 3 4 1	1 2 -9		
		1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95		2 3	1 2 0	2 3 4 1	1 2 -9		
		1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95		2 3	1 2 0	2 3 4 1	0 1 2 -9		

		1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95		2 3	1 2 0	2 3 4 1	1 2 -9		
		1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95		2 3	1 2 0	2 3 4 1	1 2 -9		
0		1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95		2 3	1 2 0	2 3 4 1	1 2 -9		0
1		1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95		2 3	1 2 0	2 3 4 1	1 2 -9		1
2		1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95		2 3	1 2 0	2 3 4 1	1 2 -9		2
3		1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95		2 3	1 2 0	2 3 4 1	1 2 -9		3
4		1 2 3 4 5 6 7 8 9 10 11 12 13 14 -95		2 3	1 2 0	2 3 4 1	1 2 -9		4

PID	<p>C.13. Mid upper arm circumference (cm).</p> <p><i>(Only for all available children under the age of 5 years living in this household.)</i></p> <p>[ -88 ] Observation not possible</p>	<p>C.14.n. Skinfold thickness (mm).</p> <p><i>(Only for all available children under the age of 5 years living in this household.)</i></p> <p>[ -88 ] Observation not possible</p>	<p>C.16.n Height (to nearest 0.1 cm)</p> <p><i>(Only for all available children under the age of *18* living in this household, and their mothers)</i></p>	<p>C.17.n. Pulse Rate</p> <p><i>(Primary cook only)</i></p>	<p>C. 18.n. Blood oxygen level</p> <p><i>(Primary cook only)</i></p>
-----	---	--	--	---	--

1					
2					
3					
4					
5					
6					
7					
8					
9					
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11					
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13					
14					

## D. ILLNESS: RESPIRATORY AND OTHER

### Respiratory Illness

PID	D.1. Does [NAME] occasionally have <b>cough &amp; cold</b> ?  (0) No <i>(Continue across)</i> (1) Yes <i>(Continue across)</i> (-9) Don't know / not sure <i>(Continue across)</i>	D.2. Did [NAME] have <b>cough &amp; cold</b> in last 2 weeks?  (0) No <i>(Go to next person)</i> (1) Yes <i>(Continue across)</i> (-9) Don't know / not sure <i>(Go to next person)</i>	D.3. Please think about [NAME]'s most recent case of this illness in the last 2 weeks. Did [NAME] experience the symptom? <i>Read all symptoms one by one.</i>  (2) No (3) Yes (-9) Don't know/not sure									D.3.n Did you seek any medical advice from a hospital / doctor / anganwadi for this illness?  (0) No (1) Yes, as an out-patient (2) Yes, as an inpatient (95) Other (specify _____) (-9) Don't know / not sure	D.4. How much did you pay for all the treatments and advice you sought for [NAME]'s most recent episode of this illness? Please include all user fees, medicines, transportation, lodging, meals, and other expenses.  (-9) Don't know / not sure
			J. Sore throat	K. Runny /blocked nose / sinusitis	L. Faster than normal breathing	M. Wheezing sound in chest / nose	N. Colorless / green / brown mucus / phlegm	O. Fever	P. Headache	Q. Weakness / tiredness / lethargy	R. Other (specify _____)		
1	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
2	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
3	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
4	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
5	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
6	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
7	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		
8	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9		

9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9			
10	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9			
11	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9			
12	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9			
13	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9			
14	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9	0 1 -9			

**Illness (Continued)**

PID	D.7. Did [NAME] have <b>loose stools</b> in the past three months?  (0) No ( <i>Go to next person</i> ) (1) Yes (Continue across) (-9) Don't know / not sure ( <i>Go to next person</i> )	D.8. What were the other symptoms [NAME] experienced during loose stools? (Circle all that apply. Spontaneous response. Prompt 1-2 times.)(0) No other symptoms experienced (1) Watery stool (2) Bloody stool (3) Mucus in stool/white color stool (4) Thirst/dry mouth (5) Dizziness (6) Unconsciousness (7) Sunken soft spot (8) Sunken eyes (9) Very sleepy (10) Irritable/restless (-95) Other (specify _____) (-9) Don't know / not sure  Symptoms	D.9. Did [NAME] have malaria in the past year?  (0) No ( <i>Go to next person</i> ) (1) Yes (Continue across) (-9) Don't know / not sure ( <i>Go to next person</i> )	D.10. What symptoms did he/she have? (Circle all that apply. Spontaneous response. Prompt 1-2 times.) (1) Fever (2) High fever / delirium (3) Headache (4) Shaking and chills (5) Nausea (6) Vomiting (7) Dizziness (8) Shortness of breath (9) Pain (10) Tiredness / fatigue (11) Convulsions / seizure (-95) Other (specify _____) (-9) Don't know / not sure  Symptoms	D.11. Has [NAME] ever had TB? [ 0 ] No [ 1 ] Yes [-9] Don't know	PID
1	0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	1
2	0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	2
3	0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	3
4	0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	4

5	0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	5
6	0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	6
7	0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	7
8	0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	8
9	0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	9
10	0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	10
11	0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	11
12	0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	12
13	0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	13
14	0 1 -9	0 1 2 3 4 5 6 7 8 9 10 -95 -9	0 1 -9	1 2 3 4 5 6 7 8 9 10 11 -95 -9	0 1 -9	14

## I. ENUMERATOR OBSERVATIONS

*Enumerator: Please thank the respondent for the interview. This section is to be filled only based on observation. Do not ask these questions.*

*First, go back to Question C.3 and indicate any persons on the household roster who observed the interview. Then fill in the following observations.*

*I.1. Did anyone not on the household roster observe the interview?                    [ 0 ] No (Skip to I.3)                    [ 1 ] Yes*

*I.2.n Approximately how many different people observed the interview? \_\_\_\_\_*

*I.3. What is the main material of the walls of the house?*

- [ 1 ] Mud brick
- [ 2 ] Metal
- [ 3 ] Straw / hay

- [ 4 ] Wood
- [ 5 ] Stone / fired brick
- [ 6 ] Cement / cinder block
- [-95 ] Other, please specify: \_\_\_\_\_

***1.4. What is the main material used for the roof of the house?***

- [ 1 ] Metal
- [ 2 ] Straw / hay
- [ 3 ] Wood
- [ 4 ] Slate / shingles
- [ 5 ] Cement / cinder block
- [-95 ] Other, please specify: \_\_\_\_\_

***1.5. If observed, what is the main material used for the floor of the house?***

- [ 1 ] Mud
- [ 2 ] Tile
- [ 3 ] Stone / fired brick
- [ 4 ] Cement / cinder block
- [-95 ] Other, please specify: \_\_\_\_\_

***1.6. a. How would you rate the general comprehension of the survey questions by the respondent?***

- [ 1 ] Respondent understood everything well
- [ 2 ] Respondent understood most things well
- [ 3 ] Respondent understood some things well
- [ 4 ] Respondent understood few things well
- [ 5 ] Respondent understood almost nothing

***b. If 3-5 above, please indicate areas of particular difficulty*** \_\_\_\_\_

***1.8. In households that answer only “-9” to G.11 and G.14, please give your opinion about household:***

- [ 1 ] Very poor
- [ 2 ] Below average
- [ 3 ] Average
- [ 4 ] Above Average
- [ 5 ] Rich

***1.9a,n. Does this household need a stove replacement?***

- [ 0 ] No (*Skip to 1.10a,n*)
- [ 1 ] Yes

***1.9b,n. Which stove needs to be replaced?***

- [ 1 ] Greenway (*Enumerator, this means the stove is totally rusted or the housing is dislodged*)
- [ 2 ] G-coil (*Enumerator, this means the coil is broken*)

***I.10a.n. Does this household need a G-coil repair?***

- [ 0 ] No (*End*)
- [ 1 ] Yes

***I.10b.n. Why does the G-coil need to be repaired?***

- [ 1 ] The knob is broken
- [ 2 ] The plug or wire needs to be repaired
- [-95 ] Other, specify: \_\_\_\_\_

***I.11.n. Did you give the household a repair / replacement certificate?***

- [ 0 ] No
- [ 1 ] Yes

## Appendix D: Interview Guide

***Supervisor, please read and ask for informed consent:*** Hello! My name is \_\_\_\_\_, and I am working for Chirag in Nainital and Duke University in North Carolina in the U.S.A. Chirag works on a varied number of development projects in villages in Uttarakhand. Duke University is a research university in the USA. You are being asked to participate in an interview to support a research study on energy use and health in rural areas. We will ask you and other households involved in the study questions about your household – specifically about (1) your cooking practices (2) opinions and perceptions concerning your cooking conditions, and (3) health status. Your household was one of those we randomly selected to participate today. If you agree to participate in this study, you will complete a 40-minute interview with a trained interviewer. Your participation in the study is completely voluntary. You may choose not to answer any question and you can stop your participation at any time. All information you provide will be kept confidential, that is, your name or other identification will not be associated with your answers to the questions. There is no direct, immediate, and tangible benefit of participating in this survey. However, in the long run many villages including yours can benefit from the improvements in government policies.

Do you agree to participate in the interview? Yes \_\_\_ No \_\_\_

Interviews may be recorded using audio recording to assist with the accuracy of your responses. You have the right to refuse the audio recording.

Do you agree to allow the interview to be recorded? Yes \_\_\_ No \_\_\_

If you agree, we would also like to take a photograph of your kitchen and cooking arrangements. Your participation in this portion is completely voluntary. No identifying characteristics of your home or members of your family will be photographed. Only the research team will use the photographs.

Do you agree to allow a photograph of your kitchen area? Yes \_\_\_ No \_\_\_

***\*\*Test recorder by asking the respondent to answer if they understand. Play back the test audio so the respondent can hear how their voice comes through. \*\****

If you have any questions or concerns, please contact Lisa Philipponne at +91 XXXXXX or Geeta at +91 XXXXXX.

### **Treatment: Those who HAVE been exposed to ICS Intervention**

1. We'd like to start with some discussion of health and diseases. What diseases or illnesses do you think are the worst?
  - a. What makes them the worst?
  - b. Are they different among children and adults?
  - c. Has anyone you know ever had a respiratory illness, as in one that affects lungs, breathing, nose and mouth?
    - i. How does that compare to the illnesses or diseases you said were the worst?

2. How do these illnesses compare to others that your family may commonly have?
  - a. Malaria
  - b. Diarrhea
  - c. Cough & cold
  - d. TB
3. What kinds of symptoms do you know of that exist that affect breathing? Or, when you're not breathing normally, what happens?
  - a. Have you or anyone in your family had any illnesses or diseases with these symptoms?
    - i. If so, which illnesses?
    - ii. What were their symptoms?
  - b. Are you aware of how they are prevented?
    - i. How do you stop or cure it?
  - c. When was the last time you had one of these symptoms?
  - d. When was the last time you had one of these illnesses?
4. When was the last time anyone in your home had symptoms of:
  - a. cough
  - b. wheeze
  - c. sore throat
  - d. runny nose
  - e. fevers
  - f. green/brown mucus or phlegm
5. Where does the majority of your cooking take place?
6. Can you show me your kitchen? (This is where pictures are taken of consent was given)
7. What kind of stove(s) do you have?
  - a. Why do you own this type of stove?
  - b. When was the last time you got a new stove?
8. What do you cook on them? (*Make distinction when more than one stove is owned*)
9. What kind of fuel do you use?
  - a. Where do you get the fuel?
  - b. How long does it take to obtain it?
    - i. Can you show me where you get it? (*either point, describe how far, or if close, bring to location—perhaps click a pick*)
10. Did you purchase an improved stove offered by Chirag?
  - a. *If yes*, continue to Question 11
  - b. *If no*, Skip to Question 17
11. Which stove did you purchase? (*Note: answer should either be G-coil or Greenway*)
12. At the time of the sales intervention, why did you decide to purchase an improved cookstove?
13. How often do you use the stove now?
  - a. What do you like best about it?
  - b. Are there any aspects that you do not like about it?

- c. What do you use it for?
  - d. Do you notice any changes in your life since you have begun using this stove?
  - e. Is the stove performing in the ways that you expected it to?
  - f. Is the stove performing in the ways that Chirag told you it would?
14. I want you to imagine that the stoves you saw being sold were not being offered by Chirag, but by another organization. At the time do you think you would still have purchased an improved stove if it came from another organization?
- a. Which organizations would you trust to provide stoves in this area?
15. Was any of the information Chirag presented to you at the time of the sales new to you?
- a. What information was new?
  - b. What information was most important to your decision to purchase the stove?
  - c. Did the information Chirag gave you about the stove affect your decision to purchase one?
    - i. How?
16. Do you think that the stoves that were offered by Chirag have any effect on health?
- a. If yes, what effect do they have?
  - b. Have you experienced any of these effects?
- (Skip to Question 21)*
17. Why didn't you purchase an improved cookstove?
18. I want you to imagine that the stoves you saw being sold were not being offered by Chirag, but by another organization. At the time do you think you would have purchased an improved stove if it came from another organization?
- a. Which organizations would you trust to provide stoves in this area?
19. Was any of the information Chirag presented to you at the time of the sales new to you?
- a. What information was new?
  - b. What information was most important to your decision *not* to purchase the stove?
  - c. Did the information Chirag gave you about the stove affect your decision not to purchase one?
    - i. How?
20. Do you think that the stoves that were offered by Chirag have any effect on health?
- a. If yes, what effect do they have?
21. Is there anything else we haven't discussed yet that you think is important for us to know about as we consider the use of these new stoves in the future?
22. Do you have any questions for me?
- Moderator: Thank you so much for your time!*

**Control: (Those who did NOT Participate in the Intervention)**

1. We'd like to start with some discussion of health and diseases. What diseases or illnesses do you think are the worst?
  - a. What makes them the worst?
  - b. Are they different among children and adults?
  - c. Has anyone you know ever had a respiratory illness, as in one that affects lungs, breathing, nose and mouth?
    - i. How does that compare to the illnesses or diseases you said were the worst?
2. How do these illnesses compare to others that your family may commonly have?
  - a. Malaria
  - b. Diarrhea
  - c. Cough & cold
  - d. TB
3. What kinds of symptoms do you know of that exist that affect breathing? Or, when you're not breathing normally, what happens?
  - a. Have you or anyone in your family had any illnesses or diseases with these symptoms?
    - i. If so, which illnesses?
    - ii. What were their symptoms?
  - b. Are you aware of how they are prevented?
    - i. How do you stop or cure it?
  - c. When was the last time you had one of these symptoms?
  - d. When was the last time you had one of these illnesses?
4. When was the last time anyone in your home had symptoms of:
  - a. Cough
  - b. wheeze
  - c. sore throat
  - d. runny nose
  - e. fevers
  - f. green/brown mucus or phlegm
5. Where does the majority of your cooking take place?
6. Can you show me your kitchen? (*This is where pictures are taken if consent is given*)
7. What kind of stove(s) do you have now?
  - a. Why do you own this type of stove?
  - b. When was the last time you got a new stove?
  - c. How often do you use the stove now?
  - d. What do you like best about it?
  - e. Are there any aspects that you do not like about it?
  - f. What do you use it for?
8. What do you cook on them? (*Make distinction when more than one stove is owned*)
9. What kind of fuel do you use?
  - a. Where do you get the fuel?

- b. How long does it take to obtain it?
        - i. Can you show me where you get it? (*either point, describe how far, or if close, bring to location, take photo*)
- 10. Do you know what an “Improved cookstove” is, or have you heard of stoves that produce less smoke than traditional stoves?
  - a. *If yes*, what kind of non-traditional stoves do you know about?
    - i. Do you own one?
    - ii. How often do you use the stove now?
    - iii. What do you like best about it?
    - iv. Are there any aspects that you do not like about it?
    - v. What do you use it for?
  - b. *If no*,
    - i. Have you ever seen stoves that are not like the traditional one?
    - ii. What do you think of these stoves?
    - iii. *explain ICS using guide provided.*
- 11. Is there anything else we haven’t discussed yet that you think is important for us to know about?
- 12. Do you have any questions for me?  
*Moderator: Thank you so much for your time!*

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