I Z A Institute
of Labor Economics

Initiated by Deutsche Post Foundation

A Breath of Fresh Air: Raising Awareness for Clean Fuel Adoption

Farzana Afridi
Sisir Debnath
E. Somanathan

A Breath of Fresh Air: Raising Awareness for Clean Fuel Adoption

Farzana Afridi
Indian Statistical Institute Delhi and IZA

Sisir Debnath
Indian Institute of Technology Delhi

E. Somanathan
Indian Statistical Institute Delhi

ABSTRACT

A Breath of Fresh Air: Raising Awareness for Clean Fuel Adoption*

Air pollution is amongst the gravest public health concerns worldwide, and indoor sources are the largest contributors in many developing countries. In our study in central India, we randomly assign villages to a campaign by rural public health workers to either raise awareness about the adverse health effects of smoke from solid fuels and measures to mitigate them, or raise health awareness along with providing information on the universal cash-back LPG subsidy program or a control group in which neither information is provided. Using sales records of oil marketing companies, we find an over 6% increase in the purchase of LPG refills annually, almost 14% rise in monthly refill consumption and a 52% increase in self-reported induction stove usage in the combined treatment. There was no change in consumption of either LPG refills or usage of induction stoves in the health only treatment, but we observe behavioral changes - over 6 percentage points increase in the probability of the household having an outlet for smoke or a separate room for cooking. Our findings highlight the salience of financial constraints and the importance of the design of public subsidy schemes in inducing regular usage of clean fuels.

JEL Classification:	D10, D90, I15, Q53
Keywords:	air pollution, solid fuels, LPG, induction, health, subsidy, awareness, India

Corresponding author:
Farzana Afridi
Indian Statistical Institute
Economics and Planning Unit
7, S.J.S. Sansanwal Marg
New Delhi 110016
India
E-mail: fafridi@isid.ac.in

1 Introduction

Air pollution levels in households that cook with solid fuels are high and skyrocket during meal preparations. Figure 1 shows the level of PM2.5 pollutants during a typical day in a rural household in northern India.[1] While the World Health Organization's guideline for 24-hour average exposure to PM2.5 is $25\mu g/m^3$, it rises to as much as $1000\mu g/m^3$ during meal preparations in these households – 40 times greater than the safe limit. Not surprisingly, air pollution is one of the gravest public health concerns, not only in developing countries but across the world (Cohen *et al.*, 2017). Household sources from burning of solid fuels such as wood, however, are the single largest contributor in much of the developing world (Liu *et al.*, 2016; GBD-MAPS, 2018).

Our study builds on a novel program launched by the Government of India in 2016 to provide households with subsidized access to a clean fuel – bottled liquid petroleum gas (LPG). While the program has been a huge success, with more than 72 million households gaining access by June 2019, average annual usage of LPG by the existing and newly connected rural households remains less than half of what is thought to be needed to eliminate solid fuel use.[2] One reason for the low usage of LPG, of course, is poverty in developing countries. Although LPG is subsidized in India, the cost can still be considerable for poor households. Moreover, often rural households are either unaware of the government's cash-back scheme on LPG purchases or do not understand the extent of the subsidy they receive on refills. In addition, and irrespective of income, there is low awareness of the long-term health hazards of solid fuel combustion.[3]

---

[1] PM2.5 refers to atmospheric particulate matter (PM) that have a diameter of less than 2.5 micrometers. Major components of PM are sulfates, nitrates, ammonia, sodium chloride, black carbon, mineral dust, and water.

[2] More information can be found at http://www.pmujjwalayojana.com/.

[3] WHO estimates that 3.8 million premature deaths were attributable to household air pollution in 2016, mostly in low and middle-income countries. Furthermore, according to the American Heart Association, "exposure to PM2.5 over a few hours to weeks can trigger cardiovascular disease-related mortality and nonfatal events; longer-term exposure (e.g., a few years) increases the risk for cardiovascular mortality to an even greater extent than exposures over a few days and reduces life expectancy within more highly exposed segments of the pop-

We conducted a cluster-randomized control trial in 150 villages in the district of Indore in Madhya Pradesh during 2018-19. It aimed to increase awareness about the health hazards of cooking with solid fuels and the universal financial subsidy scheme for LPG. The intervention had two treatment arms: one in which awareness about and measures to mitigate the adverse health effects of cooking with solid fuels was provided to household members, and a second which, in addition to health awareness, explained the existing cash-back payment deposited directly to consumers' bank accounts by the government after they purchase a refill of LPG at market price. No awareness campaign was conducted in a third group of villages - the control group.

Comparing annual LPG consumption by households in our sample, before and after the intervention and relative to the control group, we find that providing information on both the health hazards of using solid fuels and the existing LPG subsidy led to a marginally significant 6% increase in annual LPG refill consumption. This increase took place in the summer, when LPG consumption is typically low due to the greater availability of wood relative to the wet season. Further, these effects appear to be concentrated among the less educated. Households with a head who had completed less than primary schooling, increased refill consumption significantly compared to those whose head was primary educated (or more) - precisely the type of households that need to be informed about both the health hazards of indoor air pollution and the implications of the financial subsidy on out-of-pocket expenditures on LPG refills.

When we run the analysis on monthly LPG consumption data (rather than annual), controlling for seasonality in fuel usage and internationally determined LPG refill prices, we find a 9.3% increase in refill consumption due to the overall treatment. This result is driven by a 13.6% rise in monthly refill consumption in the combined treatment. Further, the usage of induction stoves for cooking increased significantly by 40% and 52% in the overall and combined health and subsidy awareness treatment, respectively. Although the health information alone

———————————————————

ulation by several months to a few years." While PM10 particles can penetrate and lodge deep inside the lungs, PM2.5, being far smaller, can enter the blood system and contribute to the risk of developing respiratory diseases, including lung cancer, besides cardiovascular diseases. Our baseline survey revealed that 87% of the sampled households were unaware of the serious long-term risks to their own or other household members' health.

did not increase consumption of LPG refills, it led to significant behavioral changes that can reduce the inhalation of indoor smoke - households were 6 percentage points more likely to have an outlet for smoke from traditional stoves and/or use a separate room as a kitchen, compared to the control group that did not receive any information. The probability that households used only traditional cooking stoves to prepare the last meal decreased by 5 percentage points in the health information-only treatment.

Using LPG regularly for cooking instead of freely available wood and cow dung presents significant financial challenges for poor households. The fact that our results suggest effects on LPG refill purchase and induction cooking (smaller for former) in the group that received both the health and subsidy information underlines the salience of the financial constraints that households face, since both fuels require the household to incur either fixed or recurring expenses or both – subsidy awareness loosened budget constraints. In addition, the response in the health information-only treatment suggests that households adjust on the margin of reducing smoke inhalation when they are financially constrained in shifting to a cleaner fuel.

This is the first study to measure the extent to which awareness impacts mitigating behavior in the case of air pollution. Our findings have implications for clean fuel adoption well beyond India's LPG program as several countries in South Asia and Africa expand their electricity networks, bringing the possibility of electric cooking with induction stoves to hundreds of millions of people. Our second innovation is that our awareness campaign was embedded within the rural public health system. We trained existing frontline public health workers in villages to conduct a door-to-door campaign by making up to six visits to 20 randomly sampled households in the treatment villages over a nine-month intervention period. These workers were incentivized financially in a manner and at a rate that is comparable to their existing remuneration. Our experimental intervention is, therefore, not just potentially scalable but is also replicable in other contexts.

Furthermore, self-reported outcomes could be biased by yea-saying, as may have been the case in Davis *et al.* (2011), but the extent of the bias is not clear. In our study, we verify self-reports of new LPG connections, and self-reports of cylinder refill purchases, using administrative LPG sales data from India's public oil marketing companies. Our findings can also

speak to the growing literature on measuring households' willingness to pay for health and how much it depends on households' awareness (Somanathan, 2010; Kremer *et al.*, 2011; Greenstone and Jack, 2015). Even though we do not directly measure the value of clean air to poor households, our study may be the first to offer some insight on the effect of health awareness about household air pollution on fuel choice and fuel expenditure in a country which had 22 of the world's 30 most air-polluted cities in 2018.[4]

Cooking with solid fuels contributed to ambient air pollution in the now developed countries in the last century as exemplified by the infamous London fogs. The developed world cleaned up by switching to gas and electricity instead of coal and wood for cooking and heating (Freese, 2006). However, gas and electricity require considerable infrastructure as well as recurring expenditures by households. Both these requirements were thought to be too demanding for much of the developing world, especially the poorer countries of sub-Saharan Africa and South Asia. As a result, there have been many attempts to promote improved solid-fuel cookstoves starting in the 1970s and 1980s. These technologies have, by and large, failed to reduce household air pollution for a variety of reasons - they have low adoption rates (Venkataraman *et al.*, 2010), low usage rates when adopted (Hanna *et al.*, 2016; Sambandam *et al.*, 2015; Venkataraman *et al.*, 2010), and are not sufficiently effective even when used (Venkataraman *et al.*, 2010; Sambandam *et al.*, 2015). Our study, in contrast, emphasizes the adoption and regular usage of a clean fuel for cooking.[5]

The literature in economics on the effects of improving awareness about the health effects of pollution on the demand for pollution mitigation began with work on water quality and has shown mixed results. The earliest studies (Madajewicz *et al.*, 2007; Jalan and Somanathan,

---

[4]The 2018 ranking of world's most polluted cities by IQAir is available at https://www.airvisual.com/world-most-polluted-cities?continent=&country=&state=&page=1&perPage=50&cities=.

[5]The inconvenience and extra time needed for changes to household technology (e.g. bed nets, improved bio-mass stoves, and hygiene practices) is one of the biggest barriers to their adoption (Thurber *et al.*, 2013; Dupas, 2011). By contrast, LPG and induction are much more convenient than a biomass cook stove, in terms of time savings, ease of use, and reduction in eye and lung irritation. This makes switching to LPG as a preventive health technology different from those that entail adoption costs.

2008) found substantial effects of information on mitigating behavior following the provision of personalized information to recipients. Madajewicz *et al.* (2007) shows that in Bangladesh, people who were unknowingly using arsenic-contaminated wells (assumed to be randomly distributed) were more likely to switch to a safer source of water if the well was marked unsafe compared to people who were using an unmarked well. Jalan and Somanathan (2008) was a cluster RCT in an Indian city that provided test results of household water quality and found that it increased within-home water purification.

Subsequent research on this issue has also mostly been in the area of water and sanitation (Guiteras *et al.*, 2016; Bennett *et al.*, 2018; Davis *et al.*, 2011). Guiteras *et al.* (2016), however, find no impact of health information on household water chlorination and hand-washing in their RCT in slums in Bangladesh even when additional cues meant to trigger disgust and shame were added to the provision of information. Bennett *et al.* (2018) find effects on behavior and anthropometrics of hygiene information in an RCT in rural Pakistan only when visual details on bacteria were part of the informational package. Davis *et al.* (2011) in an RCT in peri-urban Tanzania show that information increased self-reports of hygiene behaviors but did not reduce the contamination of stored water.

From a policy perspective, our results indicate complementarity between improving health awareness and loosening financial constraints. Poor households may not be able to transition to regular usage of clean fuels even if they are aware of the long-term damage caused to their health by indoor air pollution. More specifically, our findings underline the importance of public subsidy design for clean fuels, both in terms of comprehension and timing. Households that were able to comprehend the cash-back nature of the LPG subsidy internalized the information that their out-of-pocket expenditure is lower than the market price they pay upfront. Thus, intimation of subsidy deposits through text messages in local languages is relevant. More importantly, depositing the subsidy amount upfront into the accounts of beneficiary households could substantively reduce the financial burden on liquidity and credit-constrained households and increase LPG take-up further.

The remainder of the paper is organized as follows. In Section 2, we discuss the existing market for bottled LPG for cooking in India. In Section 3, we outline our sampling strategy,

the experiment design and the data. We elaborate on our estimation methodology and results in Section 4. Section 5 discusses the findings and the policy implications and we conclude in Section 6.

2   Background

To buy subsidized LPG, Indian consumers must obtain a "connection" - register with one of the three state-owned oil marketing companies (OMCs) that are the only suppliers of LPG. A consumer has to pay a connection charge, a deposit for a cylinder and pressure regulator, and purchase a rubber pipe at any OMC's local distributor or "dealer". This is an upfront cost of about 3200 rupees (45 USD), which could easily be two weeks worth of monthly household income in rural areas.[6] Since 2013 all residential LPG consumers in India, irrespective of income, receive a so-called 'direct benefit transfer' (DBT) or subsidy for up to 12 cylinder refills in a year.[7] This means that when a consumer with an LPG connection buys a refill cylinder, she pays the market price to the dealer and the subsidy is credited to her bank account as cash-back within the next 2-3 days. The market price of a cylinder varied between 654 and 879 rupees during November 2017 to October 2018 in tandem with the price of imported liquefied natural gas. The government has kept the subsidized price very stable at around 500 rupees so that the corresponding subsidy delivered by direct benefit transfer varied between

---

[6]"Connection" is the official term that refers to registration for obtaining the pressure regulator and consumer booklet along with the first cylinder. A connection entitles the consumer to the LPG subsidy. To register for a connection a consumer has to provide proof of identity and address and submit a security deposit equivalent to 25 USD. The security deposit is for the empty 14.2 kg capacity cylinder plus the pressure regulator. The consumer has to pay the market price separately for the gas in the cylinder (10 USD) and a stove (10 USD). While the stove can be purchased in the open market, the regulator and refill cylinders are supplied only by the OMCs through their dealers. The pressure regulator has to be returned by the consumer (along with an empty cylinder) to recover the deposit. Note that the the average rural household income was approximately 7215 rupees (100 USD) per month in 2011, the latest year for which these estimates are available (Desai *et al.*, 2011).

[7]Throughout this document, we refer to a cylinder with 14.2 kgs of LPG, the standard size of a cylinder in the Indian market.

159 and 376 rupees during this period.[8]

To expand access to LPG, the Government of India launched the Pradhan Mantri Ujjwala Yojana (PMUY) in April 2016.[9] The PMUY is the largest program on access to clean fuel in India's history and the world, reaching 72 million poor families between April 2016 and June 2019. The program mandates that a woman in a rural, socio-economically disadvantaged household, obtaining an LPG connection (giving a right to buy subsidized gas) bears no upfront cost. The security deposit, along with administrative charges for a connection are borne by the government. The woman also receives an interest-free loan from the OMC to purchase the stove and the gas in the first cylinder.[10] The program has positioned itself as an initiative that empowers rural women and, therefore, does not emphasize health (or financial subsidy) awareness. While it has been successful in significantly improving rural households' access to

---

[8]All registered consumers are assigned a unique consumer number and a booklet that records, among other details, the date of LPG connection, LPG dealer, and purchase of every LPG refill. Consumers can purchase refills from the OMC approved dealers serving their village. A consumer with a connection can obtain a cylinder refill by first booking one through a phone call to her local dealer. Typically, the local dealer delivers booked refills in exchange for empty cylinders by mini trucks within a week of booking. All OMCs sell LPG connections and cylinder refills at similar (government regulated but internationally determined) market price. To elaborate on how the DBT functions, if the market price of an LPG cylinder is 820 rupees, the consumer pays this amount to the LPG dealer at the time of delivery. The dealer enters the refill purchase against the consumer's ID in a centralized database. The subsidy amount of 320 rupees is then directly deposited into the consumer's linked bank account within 2-3 days of purchase. Since the shift to the DBT system in 2013, corruption through leakages in the LPG subsidy or false reporting of refills is greatly reduced Barnwal (2016).

[9]This translates as Prime Minister's Brightening Program.

[10]Under the PMUY program, only those women who belong to socio-economically deprived (based on caste and income) households, are entitled to the subsidy of USD 25 to obtain the connection. While they do not pay the remaining USD 20 at the time of getting the connection they too have to pay for the gas in the first cylinder at market price and stove eventually. Thus, effectively the USD 20 is a loan from the OMC to the consumer which will be recovered from her refill subsidy at some point by the government. Initially, the loan was to be recovered by paying the direct benefit transfer to the OMC instead of the customer every time a PMUY customer purchases a refill of the cylinder. But since April 2018 the government has stopped withholding the direct benefit transfer to the bank accounts of the PMUY beneficiaries to encourage them to increase LPG consumption.

LPG for cooking, the PMUY program is yet to ensure an increase in LPG usage.[11]

Nationwide, an estimated 79% of the households had an LPG connection in 2018 (PPAC Report, 2018).[12] We focus on rural India since LPG use is much lower than in urban areas with the former having a mean annual consumption of about four cylinders and the latter about eight.[13] There are several factors, in addition to income, that are important in explaining the low demand for LPG in rural India. In forested areas, easy access to firewood reduces demand for LPG. Habit, familiarity, and custom can lead to a preference for traditional fuels even in areas that do not have freely available firewood (Gupta et al., 2020; Aklin et al., 2015) and LPG costs less than buying firewood from the market (e.g., monthly firewood purchase for a family of 4-5 members is approximately 500-800 rupees).

Furthermore, many rural households are unaware of the subsidy on LPG because it is deposited in a bank account that they may not monitor often. Text messages to registered phones intimating customers about the transfer to their bank account are in English and not the local language (e.g., Hindi, in north India). Physical or remote access to account information on fund availability is limited, particularly for women. Both features of the subsidy scheme - variation in subsidy amount and cash-back - suggest that uneducated and liquidity constrained consumers may not be able to either comprehend or take advantage of the subsidy. Finally, lack of awareness of the health consequences may cause rural households to continue using solid fuels even if they can afford LPG.

---

[11]A newspaper article covering the story can be found at https://www.downtoearth.org.in /news/energy/govt-admits-refilling-lpg-cylinders-under-ujjwala-a-challenge-plans-a-new-scheme-63835.

[12]Data from Census (2011b) reveals that 28.5 percent of households in India had access to LPG with 65 percent coverage in urban areas and only 11 percent coverage in rural areas. However, since the launch of PMUY in 2016, access in rural areas has gone up significantly but with large geographical variation - north India (e.g., 44% coverage in Jharkhand) continues to lag behind the south (e.g., 100% coverage in Kerala).

[13]Since LPG sales data are not available publicly; these figures are based on authors' estimates from data shared by OMCs for the study area and media reports (https://www.thehindubusinessline.com/economy/ujjwala-connections-get-three-refills-annually-on-an-average/article25798623.ece).

3 Experiment Design and Data

3.1 Sampling

We implemented a cluster-RCT in the rural areas of Indore district in Madhya Pradesh (MP), the second-largest Indian state by area and the fifth largest by population with over 75 million residents. Over 60% of households (rural and urban) had an LPG connection in January 2018 (PPAC Report, 2018) in MP. Indore, being the commercial hub with the highest per capita income amongst all districts in MP, is less likely to be subject to supply-side constraints on households' LPG access. The location is, therefore, suitable for examining factors limiting household demand for clean fuels.

We randomly sampled 150 GPs of the 250 GPs in the rural census blocks of Indore district (excluding 11 GPs with a population of less than 10 or more than 5000 households) and selected the largest village, by population, from each sampled GP.[14] In the sampled village, a household was deemed eligible for the study if it had a currently residing member either less than 10 years or more than 55 years of age or both – demographic groups which are typically more vulnerable to adverse health effects due to indoor air pollution. 20 eligible households were randomly sampled in each of these villages by systematic random sampling during the baseline survey.[15]

The RCT design included three arms - (1) health awareness (H) (2) health and financial subsidy awareness (H+S) (3) no awareness campaign or the control group (C). Therefore, the 150 villages were randomly assigned to one of the three arms with 50 villages in each. However, during the training of the public health workers who were carrying out the intervention, we were informed that four villages in each of the two treatment arms either did not currently have an officially appointed health worker (three villages) or the current worker had a health

---

[14]All population estimates and other village-level data were based on the 2011 Census of India.

[15]Following this sampling procedure, first an estimate of the total number of households (N) in the village was obtained by the survey team. Then, every N/20th household, starting from the center of the village and moving in a clockwise direction to come back to the starting point, was selected for the survey.

emergency (unrelated to indoor air pollution, one village) or could not be contacted for the training (four villages). Throughout, we report the Average Treatment Effect on the Treated (ATT) as our main analysis with the original 50 villages assigned to the control group and the 46 villages that received the treatment in each of the two treatment arms.[16]

Figure 2 shows the geographical spread of the sampled villages, by treatment status, across Indore district. Note that the average distance between the centroids of any two nearest neighboring villages in our sample was 1.5 km.

3.2 Information Campaign

Table 1 shows the timeline of the study. The baseline survey was conducted from 1st November - 22nd December, 2018. Households in the sample were asked whether they currently have an LPG connection or not. If they did, details of the connection, including the unique consumer ID, number of refills in the past year were recorded from their consumer booklets accompanied by photographs of the consumer details and refills in the booklet. Detailed information on household composition, fuel use and collection, health awareness, primary cook's time use, and wellbeing were gathered for all households irrespective of LPG connection status. Appendix. B contains the English translation of the Hindi baseline questionnaire.

Following the baseline, in January 2019, the intervention to increase adoption and regular usage of LPG was initiated for nine months, until September 2019. Specifically, we designed an awareness campaign on the health and financial benefits of switching to regular usage of LPG for cooking. The campaign centered around improving households' understanding of (1) health impacts of solid fuels and measures to mitigate inhalation of indoor smoke (2) the government subsidy to LPG consumers. We leveraged the existing public health system by engaging Accredited Social Health Activists (ASHAs) to deliver the information – female residents of the village, who had completed at least 10th grade, were between 25–45 years of age, and were employed by the state government to provide public health services. [17]

---

[16]Later, in Appendix. A we report Intention to Treat (ITT) estimates using the original treatment assignment.

[17]Usually, there is one ASHA per village. The guidelines framed by the National Rural

ASHAs of the treatment villages were trained by the NGO, Madhya Pradesh Voluntary Health Association (MPVHA), which has been conducting ASHA training modules on behalf of the state administration for several years, along with the research team. The training was conducted over two days in the three block headquarters. The ASHA training manuals, translated from Hindi into English, are included in Appendix. C.

During the training, ASHAs were first made aware of the adverse health impacts of solid fuels, including a list of diseases, their symptoms, and consequences. They were then provided with hand-held tablets with videos, a campaign manual, and detailed written scripts to follow for up to six household visits. The visits were scheduled for the first 15 days of January, February, March, and June, and the last 15 days of August and September. The frequency of these visits was higher during the winter season, when solid fuel usage is usually high and lower during the rainy season when households may anyway use LPG more often due to the non-availability of dry wood.

The information on health (H) centered around the adverse health effects of household air pollution on all household members, emphasizing children and older adults who are more susceptible to respiratory and cardiovascular diseases. The campaign included three customized videos that depicted a typical rural household whose kitchen is in a common room in the house, making not just the primary cook but all household members susceptible to inhaling smoke. A licensed medical doctor then talks about long-term health impacts like low birth weight, asthma, cardiovascular disease, and lung cancer, of indoor smoke. Each video focused on a different set of diseases, with the doctor advising them to stop using wood and other solid fuels and switch entirely to LPG. Most importantly, every video ends with the doctor advising the household to ensure an outlet for smoke from the traditional cookstove (*chulha*) and to use an induction

Health Mission allow for 43 different tasks for ASHAs relating to, for example, immunization, antenatal care, institutional delivery, and family planning. There is a specific remuneration set for each task. The maximum they can earn for an activity is 5,000 rupees for administering medicines to drug-resistant tuberculosis patients to just one rupee for distributing an ORS (oral rehydration solution) packet. Hence their monthly remuneration is directly dependent on their activities in that month. In our intervention, ASHAs were paid 50 rupees per visit per household.

stove for cooking if the household is unable to obtain an LPG refill. In a fourth video made of comic strips, we narrated a story in which the main characters (a new bride and her mother-in-law) had conflicting views about using LPG, again aimed primarily at emphasizing the adverse health impacts of traditional, solid fuels.[18] Each video was approximately two minutes long.

In the health and financial subsidy treatment arm (H+S), besides the health awareness training to ASHAs, the details of the LPG subsidy and its cash-back design were also explained. This included explanation of the direct benefit transferred to the beneficiary bank account on each purchase of up to 12 cylinders per year per connection by the government and its intimation through text messages.[19] The bottom line is that households were to be made aware that their effective out-of-pocket expenditure was no more than Rs. 20 per day in a month if they consumed one 14.2 kg LPG cylinder per month (or approximately 500 rupees per month, post-subsidy), the typical requirement of a family of 4-5 members if it cooks exclusively on LPG. Thus the H+S treatment arm provided the same health information plus the LPG subsidy details.

The treatment group ASHAs were, thus, given a specific scripted task for each of the six visits, including instructions on which video(s) to show during each visit and the conversations/discussions to have with the sampled households. The four videos were shown in the first three household visits, while the remaining three visits reinforce the message with no new information. It was important that ASHAs visited the households when the household head and the primary cook were available. The ASHAs in the control group villages were not contacted by the research team. [20]

Following the completion of the intervention, the endline survey was conducted between

---

[18]We are grateful to David Levine for sharing the material for this story with us.

[19]In the H+S arm, we also trained ASHA workers on how to register household mobile phones with the OMCs, read the text messages confirming deposit of subsidies and provide information on obtaining refill LPG cylinders, if requested by the household.

[20]To prevent spillover of information to the control group, the ASHAs were given strict instructions to share the information only with the 20 sampled households in their village, and the tablets were not equipped with chips that would allow the videos to be easily shared. Moreover, since the work area of the ASHAs is restricted to their village, they are unlikely to extend their domain beyond and impinge upon another ASHA's work area.

24th October and 31st December 2019. Thus the households surveyed in the baseline were revisited during the same season approximately a year later. Only 54 of the 3000 households could not be reinterviewed at endline, hence attrition is negligible (1.8%).[21]

3.3 Data

Our baseline survey shows that even if households have an LPG connection, they frequently use solid fuels. As high as 75% and 88% of all households reported using firewood and dung-cakes for cooking, even though 74% of the sample had also used LPG in the previous month.

To validate our premise that low-level awareness of the long-term adverse health effects of solid fuels is pervasive in rural India, we asked the respondents whether they thought there were any health effects of indoor smoke. Only 13% of the respondents stated that there could be long-term health effects of inhaling smoke from solid fuels. 70% of the households expected only short-term health impacts that cause temporary discomfort and have no long-term implications.[22] The low health awareness is accompanied by misinformation about the subsidy scheme. Conditional on having an LPG connection, almost 33% of sampled households disagreed with the statement that the government deposits a subsidy in their bank account after they purchase an LPG cylinder and only 51% agreed that their out-of-pocket expenditure was less than the market price of an LPG refill. Over 32% of respondents believed that the refill subsidy is not universal and only PMUY customers are eligible to receive the subsidy.[23]

---

[21]We ensured compliance with the treatment status through regular monitoring of the ASHA workers' performance. Towards this end, monitors appointed from the MPVHA, along with the project Research Assistant, conducted meetings within two weeks of the end of the designated period for household visits. During the monitoring process, the ASHA workers' tablets were checked for date and time stamps on the photographs taken during the household visit and phone calls were made to the sampled households to verify the interaction with the ASHA. Payments to ASHAs for each visit were released only after the entire monitoring process was complete.

[22]We also gave the household a list of nine diseases (in random order), six of which can be caused by indoor smoke (e.g., hypertension) and three which were not (e.g., anemia) and asked whether that disease/ailment can occur due to inhaling smoke from solid fuels or not. The proportion of households with all correct responses was low at 4%.

[23]The subsidy awareness questions were asked only at the endline.

Table A.1 in Appendix A shows the balance at baseline between the three groups at the village and household level using data from the Census (2011a,b). The top panel reports the average village-level amenities, while the bottom panel shows the average household level amenities. We find no significant differences in educational and health facilities between groups. At the household level, the proportion of households using firewood or LPG for cooking is comparable. There are no significant differences in ownership of other amenities such as toilets or tap water, which may reflect household health preferences. In Table 2, we show similar comparisons of household characteristics from our baseline survey data. Except for the pairwise difference in household head's education at 10% significance level, there are no differences in households observable characteristics or perceptions regarding the effects of solid fuels and trust in ASHAs.

In Table 3 we report solid fuel and LPG usage of these sampled households. We do not find differences in usage and access to fuels between the three groups, except in the quantity of dung cakes purchased at 5% or higher level of significance. Using the unique consumer ID we recorded from the LPG consumption booklet, we matched our sampled households to the OMCs' sales data and were able to verify the number of LPG refills purchased and the date of each purchase.[24] There are no significant differences in the number of LPG refills consumed by the household (approximately 3.2 cylinder refills in the previous 12 months), annually or per month across seasons, unconditional on having an LPG connection. Overall, our baseline data suggest successful randomization into the three arms at the household and at the village level (Table A.1).[25]

---

[24]Self-reported LPG refill consumption is highly correlated (over 0.77) with OMC sales records.

[25]Our final household sample is as follows: 3000 at baseline + three that split at endline = 3003; of the compliant villages (160 households in eight non-compliant villages are dropped), 62 were unmatched with the OMC sales data and 52 attrited, giving us a total sample of 2729 households.

4 Estimation Methodology and Results

4.1 Estimation Methodology

Our first specification clubs exposure to the H (health awareness) or H+S (health + subsidy awareness) campaign into a single indicator of treatment status that takes value one if a household was exposed to either treatment and zero otherwise (control group). The OLS specification is thus:

$$Y_{iv}^1 = \beta_c + \beta_T T_v + \beta_0 Y_{iv}^0 + \beta_X' \mathbf{X}_{iv} + \beta_Z' \mathbf{Z}_v + \varepsilon_{iv}, \tag{1}$$

where Y_{iv}^1 is the number of refills (or other outcomes) purchased by the ith household in village v at endline, i.e., between 1st February (month following the first ASHA visit in January 2019) and 31st December 2019 (approximately two months after the last ASHA visit in September 2019). Y_{iv}^0 is the baseline number of refills (or other outcomes) purchased by the same household (i.e., 1st Feb - 31st Dec 2018).[26] T_v is a dummy variable indicating whether village v is assigned to either treatment or not and $\mathbf{X}_{iv}$ are a set of baseline characteristics for household i in village v. These controls include household size and assets, education and primary occupation of the household head, education and age of the primary cook, indicators for household religion and caste.[27] Finally, we also control for a set of village characteristics, $\mathbf{Z}_v$, the proportion of irrigated land, and indicators for the presence of private primary schools, health sub-centre, and all weather road access. In our preferred specification, besides these control variables, we include sub-district fixed effects to account for the variation in the administration of the local

---

[26]We use administrative data on refill consumption as our main outcome of interest throughout the analysis. Note that the period of the consumption data, either from consumer booklets or self-reported, would vary by the date of interview of the household while the administrative records provide consumption information for all households for the same period.

[27]Since ownership of different household assets is likely to be highly collinear, we use the first component of a principal component analysis over several indicators measuring the economic status of a household. These indicators include ownership of land and farm animals, *pucca* house, and a list of consumer durables. Education of the head of the household and the primary cook is measured by an indicator that takes the value one for above primary education and zero otherwise.

health department under whom the ASHAs function.[28]

The parameter of interest is β_T, which represents the impact of the awareness campaign (either health or health and subsidy) on the consumption of LPG. Since the treatment status was randomly assigned to the sampled villages, households' exposure to treatment was entirely exogenous. Therefore, the OLS estimation of β_T from equation (1) is the average treatment effect on the treated (ATT) of the awareness program. If information improves LPG refill consumption (or other outcomes) then β_T should be significantly positive.

Our second specification distinguishes between the two types of treatments to estimate and compare the impact of the health and subsidy awareness on LPG uptake and other health seeking outcomes.

$$Y_{iv}^1 = \beta_c + \beta_T^h T_v^h + \beta_T^{hs} T_v^{hs} + \beta_0 Y_{iv}^0 + \beta_X' \mathbf{X}_{iv} + \beta_Z' \mathbf{Z}_v + v_{iv}, \tag{2}$$

where T_v^h is a dummy for assignment of village v to the health awareness treatment and T_v^{hs} a dummy for assignment to the health and subsidy awareness treatment. The other variables are as explained above. If information of long-term health impacts of solid fuels alone increases LPG refills then β_T^h should be significantly positive. If the information on LPG subsidy enhances the health awareness treatment, i.e., the two treatments complement each other, then β_T^{hs} should be positive and significantly larger in magnitude than β_T^h. Standard errors in both specifications in equation (1) and (2) are clustered at the village level.

---

[28]The specification includes all controls explicitly mentioned in the pre-analysis plan except 'distance of village to block headquarters', since Census data on this variable is missing for 260 households (13 villages). We control for 'presence of govt. middle school', 'proportion of households with electricity' and 'proportion with latrine' in the village as proxies for distance from block headquarter and household preferences. We also include 'gender of household head' and 'marital status of household head' as additional relevant controls for our context. All results with the set of controls explicitly mentioned in the pre-analysis plan (and without sub-district FE) are included in Supplementary Data Analysis.

4.2 Overall Results

Table 4 shows the results from specification 1 (columns 1 and 2) and specification 2 (columns 3 and 4).[29] Columns 1 and 3 report the results with all controls but without sub-district FE while columns 2 and 4 include sub-district FE. Throughout we report estimates unconditional on households having an LPG connection at baseline. The results show that while there was no significant effect of the intervention overall (columns 1 and 2), in the H+S treatment households purchased 0.193 additional refills (p=0.073) when we account for sub-district level variation in the public health administration, as shown in column 4. The coefficient on H treatment is positive but insignificant. This suggests that refill consumption increased by 6.19% (i.e., 0.193/3.12) when the health and subsidy information was combined. The impact of the H+S treatment is, however, not significantly different from that of H, while both treatments are jointly significant, as reported in the bottom panel of Table 4.

Our results also hold in the sample of households which had an LPG connection at baseline (see Table A.3, column 4 in Appendix A), indicating that the impact was primarily at the intensive margin. We also report similar ITT estimates (following our original treatment assignment for all 150 villages) in Table A.4.[30] The estimated impact on annual refill consumption is driven by 0.092 additional refills (p=0.051) consumed in the summer season in the H+S treatment, as shown in column 2 of Table A.6.[31] In all subsequent tables we report results with sub-district FE.

Next, we run the analysis by monthly LPG refill consumption in Table 5 since households

---

[29]The mean difference-in-differences between the control and each treatment group is positive for H+S and negative for H, but insignificant, as shown in Table A.2 in Appendix A.

[30]Using specifications (1) and (2), we estimated the impact of our intervention on: (1) household having an LPG connection and (2) a household using LPG for cooking at the endline, both unconditional on LPG connection. We find insignificant impact of treatment as shown in Table A.5, Appendix A.

[31]Using the past eight years of temperature and rainfall data for Indore from the Indian Meteorological Department we define the period between 16th October to 15th March as cold, 16th March to 15th June as summer, and 16th June to 15th October as wet. As expected, refill consumption did not increase significantly in either the rainy season (when LPG usage is higher than usual due to non-availability of dry wood) or the winter season.

make refill purchase decisions month-by-month. This allows us to take into account the observed variation in the market price of LPG refill across months, (which is determined by the international prices and hence exogenous to our sampled households) as well as the larger seasonal (vis-a-vis annual) variation in households' refill consumption. Interestingly, we find a significant increase of 0.026 (p=0.056) refills per month due to the overall treatment and 0.037 (p<0.05) refills per month due to the H+S treatment, unconditional on refill prices in column 2. When we control for the monthly market price of LPG our estimates in columns 3 and 4 are unchanged, and signify a 9.3% and 13.6% increase in monthly LPG refill consumption due to overall and H+S treatment, respectively. However, the coefficient on the monthly price is significantly negative, suggesting that higher prices dampen refill consumption despite the cash-back subsidy keeping the out-of-pocket expenditure more or less constant at 500 rupees per refill. This reinforces our claim that households may not be comprehending the subsidy scheme fully. Note that we do not find a significant effect of the treatment when interacted with the LPG price (column 6).[32]

Overall, we find suggestive evidence of effects of the information campaign on LPG refill consumption only in the combined H+S treatment arm, although the point estimate is not significantly different from that of H treatment. The estimated impact of the treatment is somewhat larger on monthly, rather than annual, refill consumption. Overall, the results underline the binding financial and liquidity constraints faced by poor families in rural areas. They suggest complementarity between health and financial information - health awareness alone may not be sufficient for raising clean fuel take-up significantly.

---

[32]Algebraically, the annual estimate of impact on LPG refills should be equivalent to the monthly estimate multiplied by 11 (months). In Table A.7 we show this is exactly the case when we do not control for the baseline refill consumption. Thus the non-equivalence between the two sets of estimates (Table 4 vs. Table 5) is arising due to the time varying regressors and higher variance in monthly refill consumption vis-a-vis annual consumption, as indicated by the lower correlation (coefficient on baseline value) between the baseline and endline monthly refills.

4.3 Heterogeneity

The above findings could vary with both demand-side factors, e.g., the economic status of households, education of the household head and decision-making abilities of the primary cook, as well as supply-side factors such as distance to the LPG dealer. We use specifications 1 and 2 to analyze heterogeneity in the impact of the treatment effects on annual LPG consumption in more detail in Tables 6 and 7.

The effect of exposure to the treatment might vary by the level of education of the head (and/or primary cook) of the household – less educated households are more likely to be unaware of both the health impacts and the design of the LPG subsidy. We, thus, interact the treatment indicator(s) in equations (1) and (2) with a dummy that equals one if the education level of the household head was above primary schooling at baseline, and zero otherwise. A positive coefficient on overall treatment in Table 6, column 1, suggests an effect of 0.255 ($p<0.05$) additional LPG refills purchased but significantly lower for the more educated households who purchased 0.345 fewer refills, as suggested by the interaction term. Column (2) gives similar results - the coefficient on H+S treatment is significantly positive at 0.390 ($p<0.01$) but negative (-0.502) when interacted with household head's education. We find similar, significantly negative coefficient ($p<0.01$) on the interaction of treatment dummy with the primary cook's education. These findings, thus, suggest, that there was significant improvement in the LPG take-up by less educated households who are likely to have lower awareness. Indeed, we find that households whose heads had less than primary schooling were significantly less likely to respond correctly to our questions on awareness of the financial subsidy on LPG, relative to those whose heads had above primary education ($p<0.01$).[33]

As discussed previously, the consumption of LPG refills is subsidized in India. Consumers pay the market price, and the subsidy is directly credited to their bank accounts. As a result, the market price is higher than the out-of-pocket price. This difference can be substantial for economically disadvantaged and liquidity constrained consumers, and they might be more impacted by the awareness campaign on the LPG subsidy. To measure this heterogeneity in

---

[33]We do not find a significant difference in health awareness of households by the education level of their household head.

treatment effects by household wealth, we interact the treatment indicator(s) in equations (1) and (2) with the asset index of the household at baseline. Table 6, columns 3 and 4 show a negative, although insignificant, coefficient on the interaction terms, suggesting that treatment effects did not vary by household wealth.[34] Finally, in columns 5 and 6, we interact the treatment indicators with an index of the primary cook's decision-making power.[35] The coefficient on the interaction term is negative, albeit insignificant, in column 5.

Next, we assess how supply-side factors, particularly accessibility, may impact the usage of LPG in Table 7. Depending on current LPG usage, we measure a household's distance from the local LPG dealer in a couple of ways. In columns 1–2, for households with LPG connections, we use the distance to their actual dealer; and the nearest dealer for those without LPG connections. Since the choice of LPG dealer is endogenous, in columns 3–4 we do not distinguish between households' with and without LPG connections and use the distance to the nearest dealer for all.[36] Using these distance measures to the LPG dealer, we create an indicator variable that equals one if the household is further away from the median distance and zero otherwise. Interestingly, the impact of H+S treatment is positive and insignificant for households whose LPG dealer is located further away, as indicated by the interaction of this variable with the H+S treatment in column 2. The negative, but marginally insignificant coefficient on the H+S interaction term ($p=0.104$), when we account for the notional or nearest dealer location in column 4, suggests that the treatment may have had a larger effect when the nearest dealer was located closer to the household.

---

[34]However, when we classify households into those with above median asset index vs. at or below median, we find that it is the latter (poorer) households that responded significantly to the H+S treatment.

[35]Following standard survey instruments, we collected information on the primary cook's say in decision-making on: (a) what to cook daily, (b) whether to buy an expensive item, (c) what to do if she falls sick, and (d) what to do if her child falls sick. We create a single index using a principal component analysis over the four measures where the responses are categorized as: (1) respondent is not involved in the decision-making, (2) respondent decides along with someone in the household, or (3) respondent is sole decision-maker.

[36]We measure distance using the geocoded locations of the sampled households and the universe of LPG dealerships in Indore district. The average distance of a sampled household to its local dealer is approximately eight km.

4.4 Behavioral Impacts and Other Fuel Usage

Recall that mixed fuel usage for cooking is the norm in rural India, as we discussed earlier. In our information campaign, the health practitioner at the end of each video emphasized measures that households could undertake to reduce smoke inhalation - ensuring an outlet for smoke and using induction cooking if an LPG refill could not be obtained. In our survey, we gathered information on households' smoke inhalation mitigating behavior. Hence we explore whether exposure to treatment increased the likelihood of households having a separate room as the kitchen, an outlet for smoke in the kitchen, and the adoption of electric induction stoves as additional outcome variables (all binary dependent variables) in Table 8 using the same specifications.

Due to the treatment, overall induction use increased by 2.4 percentage points ($p < 0.05$) - a 40% increase from baseline (column 1). This was driven primarily by the H+S treatment in which induction stove usage went up by almost 52% (column 2). We observe behavioral changes in the H treatment, even though we do not observe any impacts on LPG refill consumption (See Table 4). Households are 5.5 percentage points more likely to have an outlet for smoke or chimney due to the treatment (as observed by the surveyor) - 6 percentage points due to H and 5.1 percentage points due to H+S treatment (columns 3–4). There was also a 6.2 percentage point increase in households separating the kitchen area due to the H treatment, significantly different from the impact of H+S treatment (column 6).

We see similar impacts on usage of induction stove overall and in H+S treatment, as well as reduced usage of solid fuels (only *chulha* and only LPG) in the primary cook's responses to fuels used in the last meal that she had cooked in Table 9. The probability that induction stove was used for cooking the last meal increase by 0.7 percentage points due to the overall treatment, as shown in column 1, and by 1.3 percentage points in the H+S treatment (column 2). The impact on induction usage in preparation of the last meal is marginally greater in H+S treatment. Usage of only LPG for cooking the last meal rose by 5.1 percentage points in the H treatment (column 4) and also in H+S treatment, albeit insignificantly. Consequently, the probability that households used *only* solid fuels for cooking the last meal fell by 5 percentage points in H treatment (column 6). Since our intervention videos carried one consistent message

22

- reduce smoke inhalation and if for any reason the household is unable to purchase an LPG refill ensure outlet for smoke and use induction stove for cooking - our message resulted in the H group changing behavior to mitigate the adverse impact of smoke inhalation on health within their budget constraints. Our results are very strong when we account for multiple hypothesis testing for correlated outcomes using the methodology proposed by (Kling *et al.*, 2007) and analyse an index of clean fuel usage in columns 7–8. There is an estimated 11.4% of a std. dev. increase in clean fuel usage in the overall treatment (column 7), 8.7% in H only and 14.1% of a std. deviation rise in the H+S treatment (column 8).

Not surprisingly, therefore, we also find a significant decline in households' collection of solid fuels - firewood and dung - due to the treatment, as shown in Table 10. In columns 1–6 we analyse treatment effects on usage and collection of firewood while columns 7–12 analyse impacts on dung. While there are insignificant impacts on usage (columns 1–2), we find a 4.1 percentage point decline in the probability that the household collected firewood in the previous month due to overall treatment and 6.3 percentage points due to the H+S treatment (columns 3–4). The number of trips made by the household to collect firewood in a typical week in the previous month declined by 0.188 due to H+S treatment (column 6). There is a larger and more significant overall effect on dung collection trips or making. The probability that the household either makes or collects dung or both declines by 6.1 percentage points due to the overall treatment (column 9). We find significant impacts of both H and H+S treatment in reducing dung making/collection (column 10). The number of times the household made or collected dung fell by almost 1 (0.861) or 18.2% due to overall treatment (column 11), driven by significant effects in both H (-0.767) and H+S (-0.956) groups (column 12).

Since our health information campaign included videos which focused on specific diseases caused by indoor smoke inhalation, we estimate the impact of the treatment on awareness of these diseases individually as well as the number of correct responses out of all nine diseases we quizzed the households on. We find an increase in awareness of pneumonia (Table A.8), although the number of correct answers did not improve significantly either for the six diseases caused by indoor smoke or including the three diseases that are not attributable to smoke inhalation that households were quizzed on (Table A.9). Note the very low correlation between

baseline and endline score (as indicated by the coefficient on baseline score), suggesting that households may have been responding to our question on whether the disease is caused due to indoor smoke randomly. We infer that our measure of health awareness is possibly invalid. It suggests that the survey questions needed better framing to elicit true perceptions or awareness of health effects of solid fuels.

On the other hand, we find an increase in self-reported long-term morbidity overall and due to the H treatment, as shown in columns 3 and 4 of Table A.10 in Appendix A. We interpret this as an increase in reporting, possibly due to improved awareness of long-term health hazards, rather than a rise in the actual incidence of morbidity. Since awareness of the short-term health impacts was high at the baseline, we do not find a significant effect of the intervention on households' self-reported short-term health morbidity due to indoor smoke (columns 1–2). We run 2SLS analysis of the effect of the number of refills the household purchased between 1st Jan - 31st Oct 2019, instrumenting it with H and H+S treatment status, on monthly health expenditures (for both short- and long-term morbidity) in Table A.11 in Appendix A to find no impacts.

5   Discussion

Our results indicate that financial constraints impede clean fuel take-up. When we provide households with information on mitigating adverse health effects of solid fuels along with the LPG subsidy program, there is a significant increase in consumption or usage of clean fuels - both LPG and induction, but small for the former. Once households realise that their out-of-pocket expenditure is lower than they thought due to the cash-back scheme, their LPG refill purchase increased. Moreover, since the (fixed) cost of an induction stove and accompanying utensils is significant (approximately 2100 - 4500 rupees or 29–62% of monthly household income, depending on the quality of the utensils and stove) for these households, awareness if the LPG subsidy had a spillover effect. It loosened the budget constraint of households in the H+S group and increased induction take-up so as to mitigate smoke inhalation.[37]However,

---

[37]The fact that the newly elected state government in December 2018 rolled out a program of free electricity to households up to some limit per month implies that households bore low

we do observe strong behavioral responses to mitigate smoke inhalation, that did not require additional expense, in the H group.

Our intervention was cost-effective. Each ASHA received 50 rupees per household per visit which equals 300 rupees for six visits per household. Fixed costs were incurred on creating the videos (800,000 rupees) and ASHA training (500 rupees per ASHA +incidentals). The variable costs, therefore, were very low at approximately USD 5 per household, and if scaled up, the fixed costs would be negligible. We can value the benefits in terms of the opportunity cost of time spent collecting/making solid fuels by the household. At baseline only 29% of households reported using LPG exclusively in preparing the last meal. 14% (29%) of households reported purchasing firewood (dung cakes) worth 790 (698) rupees in the previous month, which is more than the out-of-pocket expenditure on one LPG refill (500 rupees). 70% (70%) of households spent 44 hours (40 hours) in the previous month, on average, collecting firewood (making dung cakes). Given the minimum daily wage for unskilled labor at 280 rupees in Madhya Pradesh, this amounts to these households losing income from up to 5 days of work or 1400 rupees in a month. Thus the opportunity cost of using solid fuels can be substantial, given that the average monthly income of a rural household in the state of Madhya Pradesh was 5672 rupees in 2011 (Desai *et al.*, 2011).[38]

A possible confounding factor in establishing information as the only mechanism that impacts households' uptake of LPG is that the number of ASHA visits to the treated households was likely to have been higher than for the control group. Our experiment design did not include placebo visits by ASHAs in the control group given that at the baseline only 13% of households were aware of long-term health effects from indoor smoke. However, at the endline we gathered information on the number of visits made by the ASHA to our sampled households in each village since January 2019 through an ASHA survey. Thus, we have data on the

---

or no recurring costs of using induction.

[38]Valuing the health benefits, on the other hand, requires an assumption about reduction in air pollution associated with an additional LPG cylinder and the resulting monetary value of any positive health effects of this reduction, e.g. improvement in lung capacity. However, data on such health measures and related improvements in labor productivity are unavailable, which makes it difficult to calculate these benefits.

number of times the ASHA visited both the treatment and control households between January and October 2019. The coefficient on the interaction of the treatment dummy in equations 1 and 2 with the number of ASHA visits during this period is insignificant, suggesting that the number of ASHA visits did not affect treatment efficacy.

Another related concern is whether the nature of the campaign, rather than information per se, impacted behavior. To elaborate, our awareness campaign was conducted by existing public health workers who were also residents of the same village. If the campaign were to be conducted through impersonal text messages or unfamiliar informants would effect sizes be the same? To answer this question, we measure the heterogeneity of response to treatment on LPG refill consumption by households' trust in ASHAs from our baseline survey.[39] We do not find a significant coefficient on the interaction of household 'trust' with treatment indicator. [40]

6   Conclusion

In this study, we conducted a cluster randomized control trial to investigate whether creating awareness of the health hazards of indoor smoke from solid fuels and measures that households can adopt to mitigate them can induce households to adopt and use non-polluting fuels more regularly in rural India. We varied our door-to-door campaign by bundling health awareness with financial information on the existing cash-back LPG subsidy provided by the government in another treatment arm. We then analyzed the take-up and usage of LPG, induction and other health seeking behavior by households in villages in the health, and health plus subsidy awareness treatments vis-à-vis the control group of villages which received no information.

While we find no impacts of the intervention on the extensive margin, our results suggest a small increase in the regular usage of LPG and a large take-up of induction cooking when health

---

[39]We measure 'trust' by the response to the survey question "Do you think that the ASHA workers give you correct health information?" The possible responses were 'No', 'Yes, sometimes' or 'Yes, always'.

[40]There may have been spillover effects from treated to untreated households within our treatment villages. Unfortunately, the LPG sales data do not provide us with reliable household location information. We are, thus, unable to measure impacts at the aggregate village level to account for spillover effects.

and financial awareness were bundled together. In the health awareness only arm we observe behavioral changes to reduce smoke inhalation which did not entail additional expenditure by households. Although the estimated impacts of the two treatments on LPG consumption are insignificantly different, our findings suggest complementarity between health awareness and financial constraints. They indicate that loosening financial constraints is a key policy tool that could be adopted under the existing public health system to reduce air pollution in the most polluted, and often, poorest countries in the world. This entails redesigning existing public subsidy programs to address poor households' liquidity and credit constraints. Thus lowering the perceived cost of clean fuels through an optimally timed subsidy (upfront rather than cashback), and improving comprehension and intimation of existing subsidy programs, may be crucial.

7   Disclaimer & Administrative Information

References

AKLIN, M., RAY, S., GANESAN, K., JAIN, A., CHENG, C.-Y. and URPELAINEN, J. (2015). Access to clean cooking energy and electricity: Survey of states in india.

BARNWAL, P. (2016). Curbing leakage in public programs with direct benefit transfers. Working Paper.

BENNETT, D., NAQVI, A. and SCHMIDT, W.-P. (2018). Learning, hygiene and traditional medicine. *The Economic Journal*, **128** (612), F545–F574.

CENSUS (2011a). Census of India 2011: Village Amenities Data, Registrar General and Census Commissioner of India, Government of India.

— (2011b). Census of India2011: Household Amenities Data, Registrar General and Census Commissioner of India, Government of India.

COHEN, A. J., BRAUER, M., BURNETT, R., ANDERSON, H. R., FROSTAD, J., ESTEP, K., BALAKRISHNAN, K., BRUNEKREEF, B., DANDONA, L., DANDONA, R. *et al.* (2017). Estimates and 25-year trends of the global burden of disease attributable to ambient air pollution: an analysis of data from the global burden of diseases study 2015. *The Lancet*, **389** (10082), 1907–1918.

DAVIS, J., PICKERING, A. J., ROGERS, K., MAMUYA, S. and BOEHM, A. B. (2011). The effects of informational interventions on household water management, hygiene behaviors, stored drinking water quality, and hand contamination in peri-urban tanzania. *The American journal of tropical medicine and hygiene*, **84** (2), 184–191.

DESAI, S., VANNEMAN, R. and NATIONAL COUNCIL OF APPLIED ECONOMIC RESEARCH (2011). India Human Development Survey - II (IHDS-II) ICPSR36151-v2.

DUPAS, P. (2011). Health behavior in developing countries. *Annu. Rev. Econ.*, **3** (1), 425–449.

FREESE, B. (2006). *Coal: A Human History*. Arrow.

GBD-MAPS (2018). Burden of Disease Attributable to Major Air Pollution Sources in India, Health Effects Institute. https://www.healtheffects.org/publication/gbd-air-pollution-india.

GREENSTONE, M. and JACK, B. K. (2015). Envirodevonomics: A research agenda for a young field. *Journal of Economic Literature*, **53** (1), 5–42.

GUITERAS, R. P., LEVINE, D. I., LUBY, S. P., POLLEY, T. H., KHATUN-E JANNAT, K. and UNICOMB, L. (2016). Disgust, shame, and soapy water: tests of novel interventions to promote safe water and hygiene. *Journal of the Association of Environmental and Resource Economists*, **3** (2), 321–359.

GUPTA, A., VYAS, S., HATHI, P., KHALID, N., SRIVASTAV, N., SPEARS, D. and COFFEY, D. (2020). Persistence of solid fuel use in rural north india. *Economic & Political Weekly*, **55** (3), 55.

HANNA, R., DUFLO, E. and GREENSTONE, M. (2016). Up in Smoke: The Influence of Household Behavior on the Long-Run Impact of Improved Cooking Stoves. *American Economic Journal: Economic Policy*, **8** (1), 80–114.

JALAN, J. and SOMANATHAN, E. (2008). The importance of being informed: Experimental evidence on demand for environmental quality. *Journal of Development Economics*, **87** (1), 14–28.

KLING, J. R., LIEBMAN, J. B. and KATZ, L. F. (2007). Experimental analysis of neighborhood effects. *Econometrica*, **75** (1), 83–119.

KREMER, M., LEINO, J., MIGUEL, E. and ZWANE, A. P. (2011). Spring cleaning: Rural water impacts, valuation, and property rights institutions. *The Quarterly Journal of Economics*, **126** (1), 145–205.

LIU, J., MAUZERALL, D. L., CHEN, Q., ZHANG, Q., SONG, Y., PENG, W., KLIMONT, Z., QIU, X., ZHANG, S., HU, M. *et al.* (2016). Air pollutant emissions from chinese households: A major and underappreciated ambient pollution source. *Proceedings of the National Academy of Sciences*, **113** (28), 7756–7761.

MADAJEWICZ, M., PFAFF, A., VAN GEEN, A., GRAZIANO, J., HUSSEIN, I., MOMOTAJ, H., SYLVI, R. and AHSAN, H. (2007). Can information alone change behavior? Response to arsenic contamination of groundwater in Bangladesh. *Journal of Development Economics*, **84** (2), 731–754.

PPAC REPORT (2018). LPG Profile : Data on LPG marketing as on 01.01.2018, Petroleum Planning and Analysis Cell (PPAC).

SAMBANDAM, S., BALAKRISHNAN, K., GHOSH, S., SADASIVAM, A., MADHAV, S., RAMASAMY, R., SAMANTA, M., MUKHOPADHYAY, K., REHMAN, H. and RAMANATHAN, V. (2015). Can currently available advanced combustion biomass cook-stoves provide health relevant exposure reductions? results from initial assessment of select commercial models in india. *EcoHealth*, **12** (1), 25–41.

SOMANATHAN, E. (2010). Effects of Information on Environmental Quality in Developing Countries. *Review of Environmental Economics and Policy*, **4** (2), 275–292.

—, GUPTA, E., JEULAND, M., KAMDAR, R., KUMAR, U., NINAN, T. V., CHOWDHURY, V., CHANDNA, S., BERGIN, M. H., BARKJOHN, K., NORRIS, C., FETTER, T. R. and PATTANAYAK, S. K. (2019). Electric stoves as a solution for household air pollution: Evidence from rural india, (mimeo).

THURBER, M. C., WARNER, C., PLATT, L., SLASKI, A., GUPTA, R. and MILLER, G. (2013). To promote adoption of household health technologies, think beyond health. *American journal of public health*, **103** (10), 1736–1740.

VENKATARAMAN, C., SAGAR, A., HABIB, G., LAM, N. and SMITH, K. (2010). The indian national initiative for advanced biomass cookstoves: the benefits of clean combustion. *Energy for Sustainable Development*, **14** (2), 63–72.

FIGURE 1: Indoor and Outdoor PM2.5 Concentrations in a North-Indian Village
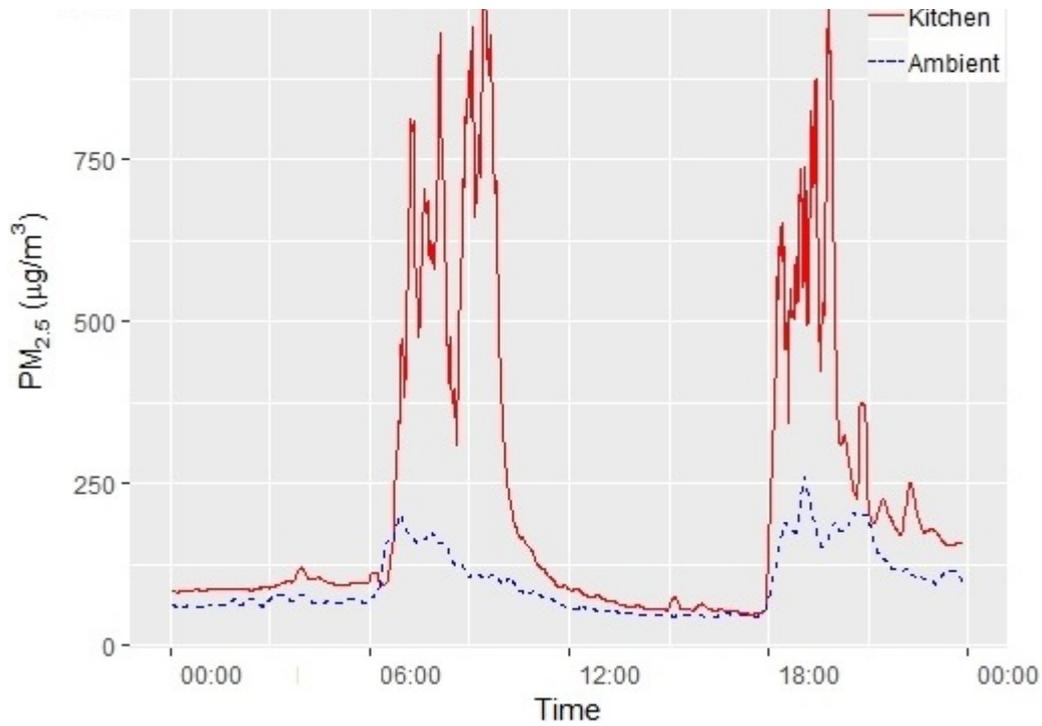
Notes: The solid line plots 15-minute moving averages of PM2.5 concentrations over a day (10 February 2019) measured in the kitchen of a household that cooks with solid fuels in a north Indian village. The dashed line shows data from an outdoor sensor in the same village and date. Both measures of PM2.5 are at one-minute resolution.
Source: Somanathan *et al.* (2019).

FIGURE 2: Map of Study Area by Treatment Status of Villages
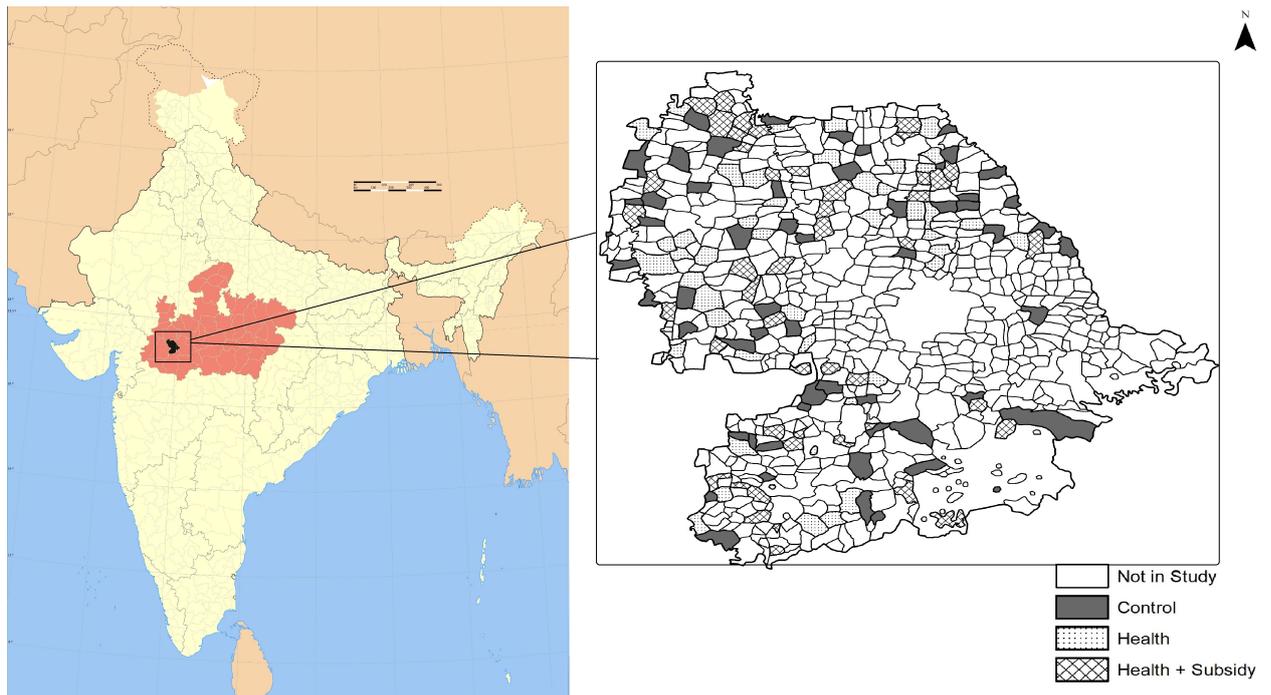
Notes: Indore block and the urban areas of the district (viz. the city of Indore, in the middle of the district) were not part of the study. The southern part of the district has few habitations due to significant forest cover.

TABLE 1: Timeline of the Study

Date	Round	Data	Sample
Nov-Dec, 2018	Baseline	Household survey	150 villages
			3000 households
Jan-Sept, 2019	*Information campaign*		92 villages
			1840 households
Oct-Dec, 2019	Endline	Household survey	150 villages
			2946 households

Notes: The survey covered the rural areas in the district of Indore. 54 households could not be reinterviewed at endline. Three additional households, that split at endline, are included separately.

TABLE 2: Balance of Household Characteristics at Baseline

	Control	Treatment		Difference		
	C	H	H + S	C - H	C - (H + S)	H - (H+S)
	(N=982)	(N=907)	(N=902)			
	(1)	(2)	(3)	(4)	(5)	(6)
Household size	6.13	6.15	6.17	-0.02	-0.04	-0.02
	(0.08)	(0.07)	(0.07)	(0.13)	(0.13)	(0.13)
Female headed hh.	0.06	0.06	0.07	0.01	-0.01	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Age of primary cook	34.16	33.89	33.57	0.27	0.59	0.32
	(0.38)	(0.37)	(0.37)	(0.72)	(0.68)	(0.64)
Household head edu. above primary	0.42	0.43	0.37	-0.01	0.05*	0.06*
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
Primary cook's edu. above primary	0.37	0.36	0.34	0.01	0.03	0.02
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
Household head is married	0.93	0.93	0.93	0.00	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Hh. head self-employed or salaried	0.51	0.53	0.49	-0.02	0.02	0.04
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
SC/ST	0.39	0.41	0.43	-0.01	-0.03	-0.02
	(0.02)	(0.02)	(0.02)	(0.04)	(0.05)	(0.05)
OBC	0.43	0.42	0.44	0.01	-0.00	-0.01
	(0.02)	(0.02)	(0.02)	(0.05)	(0.05)	(0.05)
Hindu	0.93	0.93	0.89	-0.00	0.04	0.04
	(0.01)	(0.01)	(0.01)	(0.04)	(0.04)	(0.05)
Household wealth index	1.55	1.63	1.51	-0.08	0.04	0.13**
	(0.02)	(0.02)	(0.03)	(0.06)	(0.06)	(0.06)
Trust info. from ASHA	0.83	0.81	0.84	0.02	-0.01	-0.03
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
p-values for joint significance	-	-	-	[0.87]	[0.76]	[0.39]

Notes: Sample is restricted to non-attrition households. Further, four villages have been dropped from each treatment arm due to noncompliance. Households that split at endline are included. **H** denotes health only information and **H + S** implies health and subsidy information. The *p*-values reported in the last row of the table correspond to F-test of joint significance of household characteristics in determining the treatment status in a linear probability model. Standard errors, clustered at the village level, are reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p< 0.01$.

TABLE 3: Balance of Household Fuel Consumption at Baseline

	Control	Treatment		Difference		
	C (N=982)	H (N=907)	H + S (N=902)	C - H	C - (H + S)	H - (H+S)
	(1)	(2)	(3)	(4)	(5)	(6)
Use firewood for cooking	0.75	0.73	0.76	0.03	-0.01	-0.04
	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)
Use LPG for cooking	0.72	0.77	0.74	-0.05	-0.02	0.03
	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)
Use dungcakes for cooking	0.87	0.89	0.87	-0.01	0.00	0.01
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Use induction stove for cooking	0.06	0.08	0.05	-0.02	0.00	0.02*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Qty. of firewood purchased last month (kg)	9.43	15.76	12.41	-6.34	-2.99	3.35
	(1.70)	(4.00)	(2.39)	(4.55)	(3.26)	(4.76)
Qty. of dung cakes purchased last month	20.48	38.25	32.71	-17.77*	-12.23**	5.54
	(2.25)	(9.57)	(3.68)	(9.81)	(5.08)	(10.39)
Have LPG connection	0.64	0.70	0.67	-0.06*	-0.03	0.03
	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
Total no. of LPG refills (annual)	3.12	3.33	3.30	-0.21	-0.18	0.03
	(0.11)	(0.11)	(0.12)	(0.29)	(0.30)	(0.28)
No. of LPG refills per month (winter)	0.27	0.28	0.28	-0.01	-0.00	0.01
	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)
No. of LPG refills per month (summer)	0.28	0.30	0.31	-0.02	-0.03	-0.01
	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)
No. of LPG refills per month (monsoon)	0.30	0.32	0.32	-0.03	-0.02	0.00
	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.03)
p-values for joint significance	-	-	-	[0.10]	[0.17]	[0.62]

Notes: Sample is restricted to non-attrition households. Further, four villages have been dropped from each treatment arm due to noncompliance. Households that split at endline are included. **H** denotes health only information and **H + S** implies health and subsidy information. The number of LPG refills (annual and per month) is reported for only those households who could be matched with OMC sales records (N=2729). The *p*-values reported in the last row of the table correspond to F-test of joint significance of household characteristics in determining the treatment status in a linear probability model. Standard errors, clustered at the village level, are reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p< 0.01$.

TABLE 4: Impact of Information Campaign on Annual LPG Refill Consumption

	(1)	(2)	(3)	(4)
Overall Treatment	0.095	0.113		
	(0.09)	(0.09)		
Treatment - H			0.024	0.034
			(0.11)	(0.11)
Treatment - H+S			0.166	0.193*
			(0.11)	(0.11)
Baseline Refill Consumption	0.798***	0.797***	0.798***	0.797***
	(0.02)	(0.02)	(0.02)	(0.02)
Joint Significance of Treatments			[0.283]	[0.176]
H = H+S			[0.228]	[0.183]
Control Group Mean	3.12	3.12	3.12	3.12
Sub-District FE	No	Yes	No	Yes
R-Square	0.596	0.597	0.596	0.597
N	2729	2729	2729	2729

Notes: The dependent variable is annual consumption of LPG refills between 1 Feb 2019 - 31 Dec 2019. Correspondingly, baseline refill consumption refers to annual consumption of LPG refills between 1 Feb 2018 - 31 Dec 2018. The sample is restricted to villages which complied with the assigned treatment. Household level controls include - household size, dummy for household head's education above primary level, head's occupation and marital status, dummy for household headed by female, primary cook's age, dummy for primary cook's education above primary level, dummy for non-Hindu household, household caste, household wealth index. Village level controls include - dummies for presence of govt. middle school, pvt. primary school, access to health care sub-centres, all weather road, electricity, latrine within the house and proportion of irrigated land. p values of F-tests reported in square brackets. Standard errors, clustered at the village level, are reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p<0.01$.

TABLE 5: Impact of Information Campaign on Monthly LPG Refill Consumption

	(1)	(2)	(3)	(4)	(5)	(6)
Overall Treatment	0.026*		0.026*		-0.056	
	(0.01)		(0.01)		(0.08)	
Treatment - H		0.015		0.015		-0.056
		(0.02)		(0.02)		(0.09)
Treatment - H+S		0.037**		0.038**		-0.052
		(0.02)		(0.02)		(0.10)
Market Price (in 2019)			-0.036***	-0.036***	-0.044***	-0.044***
			(0.01)	(0.01)	(0.01)	(0.01)
Market Price $\times$ Overall Treatment					0.012	
					(0.01)	
Market Price $\times$ H						0.010
						(0.01)
Market Price $\times$ H+S						0.013
						(0.01)
Baseline Refill Consumption	0.262***	0.261***	0.261***	0.261***	0.261***	0.261***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Joint Significance of Treatments		[0.063]		[0.056]		
H = H+S		[0.199]		[0.179]		
Control Group Mean	0.28	0.28	0.28	0.28	0.28	0.28
Sub-District FE	Yes	Yes	Yes	Yes	Yes	Yes
R-Square	0.084	0.085	0.086	0.086	0.086	0.086
N	30019	30019	30019	30019	30019	30019

Notes: The dependent variable is monthly consumption of LPG refills between 1 Feb 2019 and 31 Dec 2019. Baseline refill consumption refers to monthly consumption of LPG refills between 1 Feb 2018 till 31 Dec 2018. All controls included as mentioned in Table 4 with sub-district FE. The market price is of 14.2 kg LPG cylinder in hundreds of rupees in each month in 2019. p values of F-tests reported in square brackets. Standard errors, clustered at the village level, reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p< 0.01$.

TABLE 6: Impact of Demand Side Characteristics on Annual LPG Refill Consumption

	Head's Education		Household Wealth		PC's Bargaining Power	
	(1)	(2)	(3)	(4)	(5)	(6)
Overall Treatment	0.255** (0.12)		0.269 (0.22)		0.110 (0.09)	
Treatment - H		0.109 (0.14)		0.241 (0.26)		0.023 (0.12)
Treatment - H+S		0.390*** (0.15)		0.274 (0.24)		0.206* (0.11)
Characteristic	0.162 (0.13)	0.158 (0.13)	0.160 (0.11)	0.156 (0.12)	-0.063 (0.06)	-0.062 (0.06)
Characteristic × Overall Treatment	-0.345** (0.17)		-0.100 (0.13)		-0.015 (0.07)	
Characteristic × H		-0.175 (0.20)		-0.130 (0.15)		0.080 (0.09)
Characteristic × H+S		-0.502** (0.21)		-0.052 (0.14)		-0.097 (0.08)
Baseline Refill Consumption	0.797*** (0.02)	0.797*** (0.02)	0.797*** (0.02)	0.796*** (0.02)	0.793*** (0.02)	0.791*** (0.02)
Control Group Mean	3.12	3.12	3.12	3.12	3.12	3.12
R-Square	0.597	0.598	0.597	0.597	0.595	0.596
N	2729	2729	2729	2729	2638	2638

Notes: The dependent variable is annual consumption of LPG refills between 1 Feb 2019 - 31 Dec 2019. Correspondingly, baseline refill consumption refers to annual consumption of LPG refills between 1 Feb 2018 - 31 Dec 2018. Head's education is a dummy that take value 1 if above primary level and 0 otherwise. Household wealth is calculated through an index of all durable and non-durable goods owned by the household using principal component analysis. Primary cook's (PC) bargaining power is an empowerment index of decision making ability on four dimensions. To ensure uniformity of response we drop PCs who did not have children and hence were not asked about decision-making if own child falls sick in columns 5–6 (91 observations). All controls included as mentioned in Table 4 with sub-district FE. Standard errors, clustered at the village level, reported in parentheses.* $p<0.10$, ** $p<0.05$ and *** $p<0.01$.

TABLE 7: Impact of Supply Side Characteristics on Annual LPG Refill Consumption

| | Distance of Household from LPG Distributor at Baseline | | | |
| | Actual & Imputed Distance | | Imputed Distance | |
	(1)	(2)	(3)	(4)
Overall Treatment	0.170		0.441*	
	(0.20)		(0.24)	
Treatment - H		0.272		0.295
		(0.25)		(0.30)
Treatment - H+S		-0.040		0.625**
		(0.21)		(0.24)
Characteristic	0.035	0.035	-0.001	-0.000
	(0.02)	(0.02)	(0.04)	(0.04)
Characteristic $\times$ Overall Treatment	-0.008		-0.064	
	(0.03)		(0.05)	
Characteristic $\times$ H		-0.031		-0.051
		(0.03)		(0.06)
Characteristic $\times$ H+S		0.031		-0.082
		(0.03)		(0.05)
Baseline Refill Consumption	0.789***	0.789***	0.796***	0.795***
	(0.02)	(0.02)	(0.02)	(0.02)
Control Group Mean	3.12	3.12	3.12	3.12
R-Square	0.598	0.600	0.598	0.598
N	2729	2729	2729	2729

Notes: The dependent variable is annual consumption of LPG refills between 1 Feb 2019 - 31 Dec 2019. Correspondingly, baseline refill consumption refers to annual consumption of LPG refills between 1 Feb 2018 - 31 Dec 2018. For households with an LPG connection, we compute the distance from their actual/own LPG dealer, and for households without an LPG connection, we measure distance from the nearest LPG dealer using geodetic distances in columns 1–2. In columns 3–4 we measure the distance to nearest LPG dealer for all households. All controls included as mentioned in Table 4 with sub-district FE. Standard errors, clustered at the village level, reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p<0.01$.

TABLE 8: Behavioral Impact of Information Campaign

	Induction Use		Chimney / Smoke Outlet		Separate Cooking Room	
	(1)	(2)	(3)	(4)	(5)	(6)
Overall Treatment	0.024**		0.055***		0.040*	
	(0.01)		(0.02)		(0.02)	
Treatment - H		0.018		0.060***		0.062***
		(0.01)		(0.02)		(0.02)
Treatment - H+S		0.031**		0.051**		0.018
		(0.01)		(0.02)		(0.03)
Baseline Outcome	0.191***	0.192***	0.074***	0.074***	0.068***	0.067***
	(0.04)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)
Joint Significance of Treatments		[0.044]		[0.017]		[0.016]
H = H+S		[0.447]		[0.614]		[0.073]
Control Group Mean	0.06	0.06	0.73	0.73	0.65	0.65
R-Square	0.077	0.077	0.044	0.044	0.073	0.075
N	2791	2791	2791	2791	2791	2791

Notes: 'Induction use' equals 1 if the household reports using induction stove for cooking; 'Chimney or a smoke outlet' takes a value 1 if the surveyor observes an outlet in household's cooking area; 'Separate cooking room' equals 1 if surveyor observes a separate kitchen from living areas. All controls included as mentioned in Table 4 with sub-district FE. p values of F-tests reported in square brackets. Standard errors, clustered at the village level, reported in parentheses.* $p<0.10$, ** $p<0.05$ and *** $p<0.01$.

TABLE 9: Impact of Information Campaign on Choice of Cooking Fuel

	Outcomes Related to Fuel Used in Cooking Last Meal							
	Only Induction		Only LPG		Only Chulha		Last Meal's Clean Fuel Use Index	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Overall Treatment	0.007**		0.040		-0.038*		0.114***	
	(0.00)		(0.02)		(0.02)		(0.04)	
Treatment - H		0.002		0.051*		-0.050**		0.087**
		(0.00)		(0.03)		(0.03)		(0.04)
Treatment - H+S		0.013**		0.030		-0.026		0.141**
		(0.01)		(0.03)		(0.03)		(0.06)
Baseline Fuel Used	0.089	0.089	0.339***	0.340***	0.304***	0.305***	0.303***	0.302***
	(0.06)	(0.06)	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.04)
Joint Significance of Treatments		[0.033]		[0.175]		[0.143]		[0.018]
H = H+S		[0.108]		[0.442]		[0.407]		[0.413]
Control Group Mean	0.01	0.01	0.30	0.30	0.53	0.53	0.00	0.00
R-Square	0.020	0.023	0.168	0.168	0.170	0.170	0.100	0.100
N	2791	2791	2791	2791	2791	2791	2791	2791

Notes: Outcome variables are sources of fuel used by the household for cooking the last meal using only induction (=1 and 0 otherwise); using only LPG (=1 and 0 otherwise); using only *chulha* (=1 and 0 otherwise). "Only" implies that the household didn't mix fuels while preparing the last meal. The index combines all outcomes reported in col 1-6. The dependent variable in col 5-6 is recoded as 1='no *chulha*' and 0 otherwise for computing the index. All controls included as mentioned in Table 4 with sub-district FE. *p* values of F-tests reported in square brackets. Standard errors, clustered at the village level, reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p<0.01$.

TABLE 10: Impact of Information Campaign on Solid Fuel Usage and Collection

	Firewood						Dung					
	Use		Collection		Collection Trips		Use		Make/Collect		Make/Collection Trips	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Overall Treatment	-0.025 (0.02)		-0.041* (0.02)		-0.140 (0.09)		-0.004 (0.02)		-0.061** (0.03)		-0.861** (0.35)	
Treatment - H		-0.030 (0.02)		-0.020 (0.03)		-0.095 (0.10)		-0.016 (0.02)		-0.065* (0.03)		-0.767* (0.42)
Treatment - H+S		-0.020 (0.02)		-0.063** (0.03)		-0.188* (0.11)		0.009 (0.02)		-0.056* (0.03)		-0.956*** (0.37)
Baseline Outcome	0.223*** (0.02)	0.223*** (0.02)	0.205*** (0.02)	0.204*** (0.02)	0.125*** (0.02)	0.125*** (0.02)	0.184*** (0.03)	0.184*** (0.03)	0.245*** (0.02)	0.245*** (0.02)	0.310*** (0.03)	0.310*** (0.03)
Joint Significance of Treatments		[0.444]		[0.091]		[0.217]		[0.408]		[0.084]		[0.034]
H = H+S		[0.675]		[0.125]		[0.380]		[0.181]		[0.790]		[0.630]
Control Group Mean	0.75	0.75	0.54	0.54	1.82	1.82	0.87	0.87	0.64	0.64	4.72	4.72
R-Square	0.133	0.133	0.102	0.104	0.076	0.076	0.066	0.067	0.135	0.135	0.153	0.153
N	2791	2791	2552	2552	2542	2542	2791	2791	2791	2791	2791	2791

Notes: For each solid fuel, 'Use' is a dummy for whether household reports using the solid fuel for cooking in the previous month; 'Collect' or 'Make/Collect' is a dummy for whether the household collected/made the solid fuel in the previous month; 'Collection trips' or 'Make/Collection trips' is the number of times household member(s) either made trips to the forest to collect or make (for dung) the solid fuel in a typical week in the previous month. 239 observations with missing data on firewood 'collection' - 11 with missing data on firewood 'collection' and 228 with missing data at endline. All controls included as mentioned in Table 4 with sub-district FE. p values of F-tests reported in square brackets. Standard errors, clustered at the village level, reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p<0.01$.

41

Appendix. A   Additional Analysis

TABLE A.1: Balance of Village and Household Amenities (Census 2011)

	Control	*Treatment*			*Difference*	
	C	**H**	**H + S**	**C - H**	**C - (H + S)**	**H - (H+S)**
	(N=50)	(N=46)	(N=46)			
	(1)	(2)	(3)	(4)	(5)	(6)
Village amenities						
Total Households	279.48	323.26	290.61	-43.78	-11.13	32.65
	(25.629)	(23.862)	(22.564)	(35.018)	(34.148)	(32.841)
Proportion SC/ST population	0.36	0.34	0.39	0.02	-0.03	-0.05
	(0.031)	(0.030)	(0.037)	(0.043)	(0.048)	(0.048)
Pvt. primary school	0.30	0.35	0.35	-0.05	-0.05	-0.00
	(0.065)	(0.071)	(0.071)	(0.097)	(0.097)	(0.100)
Govt. middle school	0.72	0.85	0.74	-0.13	-0.02	0.11
	(0.064)	(0.054)	(0.065)	(0.084)	(0.092)	(0.085)
Primary health sub center	0.26	0.33	0.26	-0.07	-0.00	0.07
	(0.063)	(0.070)	(0.065)	(0.094)	(0.091)	(0.096)
Treated tap water	0.16	0.22	0.11	-0.06	0.05	0.11
	(0.052)	(0.061)	(0.046)	(0.081)	(0.070)	(0.077)
Open drainage	0.66	0.63	0.63	0.03	0.03	0.00
	(0.068)	(0.072)	(0.072)	(0.099)	(0.099)	(0.102)
Proportion of irrigated land	0.60	0.57	0.61	0.02	-0.02	-0.04
	(0.039)	(0.037)	(0.033)	(0.054)	(0.051)	(0.050)
All weather road	0.82	0.80	0.74	0.02	0.08	0.07
	(0.055)	(0.059)	(0.065)	(0.081)	(0.085)	(0.088)
Household amenities						
Own house	93.48	95.06	95.27	-1.58	-1.79	-0.21
	(1.099)	(0.971)	(1.071)	(1.467)	(1.535)	(1.445)
Use fire-wood	48.80	41.06	51.83	7.75	-3.03	-10.77
	(4.960)	(4.863)	(5.471)	(6.946)	(7.384)	(7.320)
Use LPG/PNG	13.05	13.47	11.36	-0.42	1.69	2.11
	(2.341)	(2.101)	(2.160)	(3.146)	(3.185)	(3.013)
Have treated tap water	4.81	5.42	5.07	-0.61	-0.26	0.35
	(1.520)	(2.010)	(2.230)	(2.519)	(2.698)	(3.002)
Have latrine within house	33.29	33.06	29.31	0.23	3.98	3.75
	(2.783)	(2.298)	(2.945)	(3.609)	(4.051)	(3.735)
Own television	45.58	46.28	42.20	-0.70	3.38	4.08
	(2.218)	(1.988)	(2.885)	(2.979)	(3.638)	(3.503)
Lighting Electricity	88.68	89.55	89.36	-0.87	-0.68	0.19
	(2.379)	(2.268)	(1.892)	(3.286)	(3.040)	(2.953)
p-values for joint significance	-	-	-	[0.95]	[0.99]	[0.72]

Notes: We use amenities data at the village and household level from the 2011 Census. Four villages from each treatment arm are dropped due to noncompliance. **H** denotes health only information and **H + S** denotes health and subsidy information. The *p*-values reported in the last row of the table corresponds to the F-test for joint significance of village- and household-level amenities in determining the treatment status in a linear probability model. Standard errors, clustered at the village level, are reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p< 0.01$.

TABLE A.2: Mean Differences in Annual LPG Refill Consumption

| Treatment Group | Treatment - Control | | Difference |
	Baseline	Endline	Endline - Baseline
	(1)	(2)	(2) - (1)
Health	0.208	0.179	-0.029
	(0.293)	(0.284)	(0.115)
Health + Subsidy	0.178	0.247	0.069
	(0.296)	(0.280)	(0.116)

Notes: N=957 for the control group; N=882 for H and N=890 for H+S. We exclude non-compliance villages. Standard errors, clustered at the village level, in parentheses.

TABLE A.3: Impact of Information Campaign on Annual LPG Refill Consumption (conditional on LPG connection at baseline)

	(1)	(2)	(3)	(4)
Overall Treatment	0.129	0.149		
	(0.13)	(0.13)		
Treatment - H			0.033	0.037
			(0.16)	(0.16)
Treatment - H+S			0.227	0.267*
			(0.15)	(0.15)
Baseline Refill Consumption	0.661***	0.659***	0.660***	0.658***
	(0.03)	(0.03)	(0.03)	(0.03)
Control Group Mean	4.70	4.70	4.70	4.70
Sub-District FE	No	Yes	No	Yes
R-Square	0.431	0.432	0.432	0.433
N	1819	1819	1819	1819

Notes: The dependent variable is annual consumption of LPG refills between 1 Feb 2019 - 31 Dec 2019. Correspondingly, baseline refill consumption refers to annual consumption of LPG refills between 1 Feb 2018 - 31 Dec 2018. The sample is restricted to villages which complied with the assigned treatment and households that had an LPG connection at baseline. Household level controls include - household size, dummy for household head's education above primary level, head's occupation and marital status, dummy for household headed by female, primary cook's age, dummy for primary cook's education above primary level, dummy non-Hindu household, household caste, household wealth index. Village level controls include - dummies for presence of govt. middle school, pvt. primary school, access to health care sub-centres, all weather road, electricity, latrine within the house and proportion of irrigated land and sub-district FE. Standard errors, clustered at the village level, are reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p< 0.01$.

TABLE A.4: ITT Effects of Information Campaign on Annual LPG Refill Consumption (unconditional on LPG connection at baseline)

	(1)	(2)	(3)	(4)
Overall Treatment	0.103	0.134		
	(0.09)	(0.09)		
Treatment - H			0.039	0.067
			(0.11)	(0.11)
Treatment - H+S			0.167	0.201*
			(0.11)	(0.11)
Baseline Refill Consumption	0.802***	0.801***	0.802***	0.800***
	(0.02)	(0.02)	(0.02)	(0.02)
Control Group Mean	3.12	3.12	3.12	3.12
Sub-District FE	No	Yes	No	Yes
R-Square	0.599	0.600	0.599	0.600
N	2882	2882	2882	2882

Notes: The dependent variable is annual consumption of LPG refills between 1 Feb 2019 - 31 Dec 2019. Correspondingly, baseline refill consumption refers to annual consumption of LPG refills between 1 Feb 2018 - 31 Dec 2018. The sample includes all 150 villages as per the original assignment of treatment. Controls as elucidated in Table A.3. Standard errors, clustered at the village level, are reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p< 0.01$.

TABLE A.5: Impact of Information Campaign on LPG Usage at Extensive Margin

	LPG Connection		LPG Use	
	(1)	(2)	(3)	(4)
Overall Treatment	-0.010		-0.001	
	(0.01)		(0.02)	
Treatment - H		-0.012		-0.009
		(0.01)		(0.02)
Treatment - H+S		-0.009		0.006
		(0.01)		(0.02)
Baseline LPG Outcome	0.799***	0.799***	0.539***	0.539***
	(0.02)	(0.02)	(0.02)	(0.02)
Control Group Mean	0.65	0.65	0.72	0.72
R-Square	0.728	0.728	0.371	0.371
N	2791	2791	2791	2791

Notes: The dependent variable is a dummy variable that equals 1 if the household has an LPG connection (col 1-2) and if it reports using LPG for cooking (col 3-4). The sample is restricted to villages which complied with the assigned treatment. Controls as elucidated in Table A.3. Standard errors, clustered at the village level, are reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p< 0.01$.

TABLE A.6: Impact of Information Campaign on Seasonal LPG Refill Consumption

	Summer		Monsoon		Winter	
	(1)	(2)	(3)	(4)	(5)	(6)
Overall Treatment	0.057 (0.04)		0.048 (0.05)		0.069 (0.05)	
Treatment - H		0.022 (0.05)		0.015 (0.06)		0.043 (0.06)
Treatment - H+S		0.092* (0.05)		0.083 (0.06)		0.094 (0.06)
Baseline Refill Consumption	0.511*** (0.03)	0.511*** (0.03)	0.662*** (0.02)	0.662*** (0.02)	0.635*** (0.03)	0.635*** (0.03)
Control Group Mean	0.84	0.84	1.20	1.20	1.09	1.09
R-Square	0.283	0.283	0.416	0.416	0.377	0.377
N	2729	2729	2729	2729	2729	2729

Notes: Outcome variable here is the seasonal consumption of LPG refills by the household. Summer refills are calculated from 16th March - 15th June for a given year, monsoon refills are calculated from 16th June - 15th October - 15th June in a given year. Winter refills are calculated from 16 October - 31 December and then from 1 March - 15 March in a given year. The sample is restricted to villages which complied with the assigned treatment. Controls as elucidated in Table A.3. Standard errors, clustered at the village level, are reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p<0.01$.

TABLE A.7: Impact of Information Campaign on LPG Refill Consumption (Annual vs. Monthly)

| | Annual Refills | | Monthly Refills | |
	(1)	(2)	(3)	(4)
Overall Treatment	0.21322		0.01938	
	(0.247)		(0.022)	
Treatment - H		0.17919		0.01629
		(0.284)		(0.026)
Treatment - H+S		0.24694		0.02245
		(0.279)		(0.025)
Constant	3.53396***	3.53396***	0.32127***	0.32127***
	(0.206)	(0.206)	(0.019)	(0.019)
R-Square	0.001	0.001	0.000	0.000
N	2729	2729	30019	30019

Notes: The dependent variable in columns (1) and (2) is the annual consumption of LPG refills between 1 Feb 2019 - 31 Dec 2019. In columns (3) and (4), the dependent variable is the monthly consumption of LPG refills between the same period. Apart from the treatment dummies and the constant, no other controls are included in the specification. The sample is restricted to villages which complied with the assigned treatment. Standard errors, clustered at the village level, are reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p< 0.01$.

TABLE A.8: Impact of Information Campaign on the Awareness of Diseases Caused by Smoke

	LBW		Pneumonia		TB		Heart Disease		Cataract		Lung Cancer	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Overall Treatment	0.016		0.050**		-0.001		0.012		-0.018		-0.021	
	(0.02)		(0.02)		(0.02)		(0.03)		(0.02)		(0.02)	
Treatment - H		0.009		0.044		-0.017		-0.008		-0.026		-0.051*
		(0.03)		(0.03)		(0.03)		(0.03)		(0.03)		(0.03)
Treatment - H+S		0.024		0.056*		0.016		0.033		-0.010		0.010
		(0.03)		(0.03)		(0.03)		(0.03)		(0.02)		(0.03)
Baseline Awareness	0.059***	0.059***	0.055***	0.055***	0.033*	0.034*	0.040*	0.041*	0.030	0.030	0.035*	0.037*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Control Group Mean	0.34	0.34	0.30	0.30	0.52	0.52	0.32	0.32	0.67	0.67	0.57	0.57
R-Square	0.023	0.023	0.021	0.021	0.022	0.023	0.014	0.015	0.020	0.020	0.018	0.020
N	2791	2791	2791	2791	2791	2791	2791	2791	2791	2791	2791	2791

Notes: Outcome variable equals 1 if the household says 'yes the disease is caused by indoor smoke'. The sample is restricted to villages which complied with the assigned treatment. Controls as elucidated in Table A.3. Standard errors, clustered at the village level, are reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p<0.01$.

TABLE A.9: Impact of Information Campaign on Health Awareness Score

	Score out of 9		Score out of 6	
	(1)	(2)	(3)	(4)
Overall Treatment	-0.040		0.036	
	(0.14)		(0.11)	
Treatment - H		-0.132		-0.056
		(0.17)		(0.14)
Treatment - H+S		0.055		0.129
		(0.16)		(0.13)
Baseline Score	0.035	0.036	0.079***	0.080***
	(0.02)	(0.02)	(0.02)	(0.02)
Control Group Mean	4.53	4.53	2.73	2.73
R-Square	0.020	0.021	0.028	0.029
N	2791	2791	2791	2791

Notes: Outcome variables here are the health awareness scores which are derived from responses to the questions Do you think that the AILMENT can occur due to inhaling smoke from use of solid fuels? (0) No (1) Yes (2) Dont know. We asked for respondents awareness on a total of 9 AILMENTS, among which 6 (low birth weight, pneumonia, tuberculosis, heart disease, cataract, and lung cancer) are caused by smoke from solid fuels while 3 (polio, diabetes, and anemia) are not, in random order. These diseases were listed in a random order. The health awareness score counts the number of correct responses to all 9 (col 1-2) or 6 (col 3-2) diseases caused by smoke. The sample is restricted to villages which complied with the assigned treatment. Controls as elucidated in Table A.3. Standard errors, clustered at the village level, are reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p<0.01$.

TABLE A.10: Impact of Information Campaign on Health Morbidity

| | Household member(s) had any morbidity (Yes/No) | | | | | |
| | Minor Morbidity | | Major Morbidity | | Morbidity Index | |
	(1)	(2)	(3)	(4)	(5)	(6)
Overall Treatment	-0.009		0.013*		0.035	
	(0.02)		(0.01)		(0.03)	
Treatment - H		-0.019		0.019**		0.042
		(0.03)		(0.01)		(0.04)
Treatment - H+S		0.001		0.008		0.027
		(0.03)		(0.01)		(0.04)
Baseline Health Outcome	0.122***	0.122***	0.133***	0.132***	0.191***	0.191***
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Control Group Mean	0.53	0.53	0.05	0.05	0.00	0.00
R-Square	0.028	0.028	0.043	0.043	0.046	0.046
N	2772	2772	2775	2775	2758	2758

Notes: Short-term/long-term morbidity equals 1 if the household responds 'yes' to the question "In the last month, did any one in the household suffer from cough, chest pain, eye irritation or breathing issues?"/"In the last year, has anybody in the household been diagnosed with a long-term respiratory/lung diseases like asthma, lung cancer, tuberculosis or COPD?" In col 5-6 the index is an equally weighted average of z-scores of short and long-term morbidity. The sample is restricted to villages which complied with the assigned treatment. Missing response to short-term (long-term) morbidity for 19 households - 7 at baseline and 12 at endline (16 households - 12 at baseline and 4 at endline). Missing responses in the health index for 33 households - 18 at baseline and 13 at endline.Controls as elucidated in Table A.3. Standard errors, clustered at the village level, are reported in parentheses.* $p<0.10$, ** $p<0.05$ and *** $p<0.01$.

TABLE A.11: Impact of Information Campaign on Health Expenditure

| | Total Expenditure on Morbidity (in Rs.) | | | |
| | Minor Morbidity | | Major Morbidity | |
	OLS (1)	2SLS (2)	OLS (3)	2SLS (4)
LPG Refill Consumption	25.842	-1106.986	775.127	12346.138
	(29.09)	(1124.74)	(686.04)	(11868.29)
Baseline Health Outcome	0.031***	0.026**	0.085	0.088
	(0.00)	(0.01)	(0.09)	(0.09)
Control Group Mean	1466.94	1466.94	6205.50	6205.50
R-Square	0.014	.	0.013	.
N	2697	2697	2713	2713

Notes: The dependent variable is the monthly expenditure by the household when one or more members are faced short-term (in previous month) or long-term health morbidity (in previous year/12). The sample is restricted to villages which complied with the assigned treatment. 32 observations are missing for short-term health expenditure and 16 for long-term expenditure. Controls as elucidated in Table A.3. Standard errors, clustered at the village level, are reported in parentheses. * $p<0.10$, ** $p<0.05$ and *** $p<0.01$.

Appendix. B Baseline Survey Questionnaire

Surveyor	*Enumerator, please note the following information about yourself.*	
	Name	
	Gender	0 Male 1 Female
	Age	
Informed Consent	*Please read the consent statement to the respondent and ask for his/her informed consent.*	
	Thank you for considering taking part in this research. The person interviewing you will explain the project to you before you agree to take part. This research project is being conducted by Farzana Afridi, Professor of Economics at the Indian Statistical Institute, along with Professor E. Somanathan (Indian Statistical Institute) and Sisir Debnath (ISB, Hyderabad), titled "Demand for and benefits from LPG usage". This research has been funded by the Bill and Melinda Gates Foundation. The purpose of this study is to evaluate and explore ways to maximize impact of LPG gas on your household's health and welfare. This research will eventually be published as a research paper. This study is anonymous. So all the information you provide will be kept confidential: that is, your name or other identification will not be associated with your answers to the questions. Your household has been chosen randomly; there is no particular agenda why we have chosen to request your participation in this study. If you are willing to participate in this research, you allow our team to conduct two surveys (one at the beginning and one at the end) related to the fuels you use and health of your household. There are no risks associated in participating in this study. The decision to participate in this study is completely yours. You can refuse to participate in the study at any time. You have the right to not answer any questions, as well as to completely exit the study at any time during the process. You have the right to ask questions about this research study at any time. If you have any questions arising from the above information please ask the surveyor now, before you decide whether to join in, or you can contact: Farzana Afridi Economics and Planning Unit Indian Statistical Institute 7, S.J.S. Sansanwal Marg New Delhi – 110016 Email: fafridi@isid.ac.in Phone: 011- XXXXXXX	
	I _____ understand the above information provided to me and I agree to participate in this study.	

I.1	Do you understand the above information and agree to be interviewed?	0 No => **End Survey** 1 Yes	
I.2	Do you agree to record this survey?	0 No => **End Survey** 1 Yes	
	Please ask for the consent of the respondent with their signature/thumb impression on the consent form. Take a photo of the signed consent form. *This survey will not be accepted by your supervisor unless the signed consent form is accompanied.*		
	Did you take the picture?	0 No 1 Yes	
Survey details			
H.1	Do you have household member(s) below 10 or above 55 years of age?	0 No => **End Survey** 1 Yes	
H.2	Survey round	Baseline Endline	
HID	Please assign a two-digit household ID. Assign a number between 1 and 20.		
	Enumerator, please note down the household ID on the time-use survey sheet.		
H.3	Attempt Number		
H.4	Is this a replacement household?	0 No 1 Yes	
H.5	What was the reason for replacing the original household?	1 Nobody at home 2 Did not give consent 3 Household not eligible 4 Did not have consumer book 98 Other (specify)	
H.6	Do you currently have an LPG connection in your kitchen?	0 No 1 Yes	
H.7	Could you show us your Consumer Book?	0	No => **End Survey**
		1	Yes => **Proceed**
		2	Not now/maybe later
H.8	Could you show us your LPG registration slip?	0	No
		1	Yes
		2	Not now/maybe later
H.9 *Asked if H.6 is NO*	Did you or any other household member ever apply for an LPG connection?	0	No
		1	Yes
		99	Don't know / Can't say
H.10 *Asked if H.9 is YES*	Why did you not get the connection?	1	Did not have required papers
		2	Delay by the dealer
		99	Don't know/Can't say
		98	Other (specify)
	The following section collects information on household location.		
HH.1	Tehsil name	1	Depalpur
		2	Hatod
		3	Indore
		4	Mhow

		5	Sawer
HH.2	Block name	1	Depalpur
		2	Indore
		3	Mhow
		4	Sawer
HH.3	Village name and ID		
	Enumerator, please note down the village ID on the time-use survey sheet.		
HH.4	Hamlet name		
HH.5	Date		
HH.6	Mobile number *Please ask the household head for his/her mobile number. If it is not available, then ask for the mobile number another household member. If no household member has a mobile number, then ask for a neighbour's.*		
LPG details ***This section is only reached if answer to H.6 and H.7 is YES***	*Please request the respondent to show their LPG consumer book. Please take a picture of the first page of the LPG consumer book, according to the method shown below. The red box indicates the Consumer ID, the pink box indicates the deposit amount, the green box indicates the date of connection, the blue box indicates the Dealer ID, and the yellow box indicates the name of the OMC. Please note this information carefully to answer the questions which follow on the next page.*		
OMC	Name of OMC	1	Hindustan Petroleum Corporation Limited (HPCL)
		2	Bharat Petroleum Corporation Limited (BPCL)
		3	Indian Oil Corporation Limited (IOCL)
		99	There is no information in the book
OMC.1	Consumer number *This ID is usually between 4-8 digits.*		
OMC.2	Dealer ID *This ID is usually between 4-8 digits.*		
OMC.3	Dealer Name		
OMC.4	Date of connection DD/MM/YYYY		
OMC.5	Did you receive the LPG connection under the government's Ujjwala program? *This question is for the household.*	0	No
		1	Yes
		99	Don't know/Can't say
OMC.6	Enumerator, is this a PMUY household? *This question is for the enumerator. Please ascertain using the first page of the consumer book. For PMUY households, the deposit amount is 0*	0	No
		1	Yes
		2	There is no information in the book
	You will be asked to take picture of the refill pages on the next page. Please take a picture of the LPG refill pages in the consumer book, according to the method shown below. The red box indicates the date of the last refill. Count the number of refills. For example, the picture below has three refills.		

	Please take picture of the LPG refill pages.		
R.1	How many refills have you purchased since 1 November 2017?		
	The next answers are to be recorded based on the entries in consumer book		
R.2	Enumerator, how many refills has the household purchased since November 1, 2017?		
R.3	Enumerator, what is the date of the last refill? DD/MM/YYYY		
LPG ID	Please take picture of the LPG registration slip photo as shown below. The red box indicates the LPG ID (UID) in the image shown below. This is a 17 digit ID. Please also note this ID. After taking all the pictures, answer the following questions.		
R.4	LPG ID *This ID should be between 16-17 digits.*		
R.5	Is the LPG ID legible?	0 1	No Yes
HHD details *Repeated for all members of household*	*The following questions are about the people who usually live in this household or are presently staying here. Please ensure that the first entry in the household roster is the household head.*		
HD.1	Name		
HD.2	Relation to the household head	0	Head
		1	Spouse
		2	Son/Daughter
		3	Sibling
		4	Son-in-law/Daughter-in-law
		5	Grandson/granddaughter
		6	Parent
		7	Uncle/aunt
		8	Nephew/niece
		9	Parent-in-law
		98	Other (specify)
HD.3	Gender	0 1	Male Female
HD.4	Age		
HD.5	Current Marital Status	1	Married
		2	Unmarried
		3	Widow/widower
		4	Divorced/separated
		98	Other (Specify)
HD.6	Currently enrolled in school or college?	0 1	No Yes
HD.7	Highest level of Education	0	Illiterate
		1	Literate, but no schooling
		2	Less than primary school
		3	Primary school complete
		4	Less than middle school
		5	Middle school complete

		6	Less than upper secondary
		7	Upper secondary complete (10th pass)
		8	12th pass
		9	BA/B.Sc.
		10	M.A./M.Sc.
		11	Ph.D.
		12	Technical education
		13	Vocational Education
		98	Other (specify)
HD.8	Main Occupation	1	Self-employed on farm
		2	Self-employed in non-farm activities
		3	Casual laborer
		4	Salaried government employee
		5	Salaried private employee
		6	Unemployed
		7	Retired
		8	Housewife
		9	Student
		10	Unable to work due to mental or physical disability
		98	Other (specify)
HD.9	Just to clarify: is [fam_name1] the household head?	0 1	No Yes
HD.10	What is household head's caste? *Please confirm the caste.*	1 2 3 4 99	SC ST OBC General (Unreserved) Don't Know
HD.10	What is household head's religion?	1	Hindu
		2	Muslim
		3	Christian
		4	Sikh
		98	Other (specify)
Kindly fill above details of all members of the household. Proceed to the next section thereafter.			
Primary Cook	*This module is for the primary cook of the household. The primary cook is the person who does the most cooking in the household. Please take the help of the household head and other members to identify the primary cook.*		
PC.1	Who is the primary cook of the household?		
	Please address all the remaining questions of the interview to [pcname].		
Fuel usage	*The following questions are on the fuels used for cooking.*		
Firewood F.1	Did you cook with Firewood in the last month?	0 1	No => **Jump to CR.1** Yes
F.2	Did you buy any firewood in the last month?	0 1	No => **Jump to F.9** Yes

F.3	How much of firewood did you purchase in the last month?		
F.4	Please mention the unit		Kilograms
		98	Other (Specify)
F.5	Just to clarify, how much does one other unit of firewood weigh in kilograms?		
F.6	Enumerator, please confirm what the conversion to KG rate is.		
F.7	How much money did you spend on firewood in the last month?		
F.8	Enumerator, please confirm that the response to this question is consistent with the response to the previous question.		
F.9	In the last month, did you or anyone else in the household collect firewood?	0 1	No => **Jump to CR.1** Yes
Questions F.10 to F.12 are repeated for all members who collect firewood			
F.10	Name of the household member who collected firewood in the last month		
F.11	In a typical week in the last month, how many times did [firename] go to collect firewood?		
F.12	How many hours did it take the last time [firename] went to collect firewood in the last month? *Please record in hours.*		
Crop Residue CR.1	Did you cook with crop-residue, twigs and leaves in the last month?	0 1	No => **Jump to DC.1** Yes
CR.2	In the last month, did you or anyone else in the household collect crop-residue, twigs and leaves?	0 1	No => **Jump to DC.1** Yes
Questions CR.3 to CR.5 are repeated for all members who collect crop residue			
CR.3	Name of the household member who collected crop residue in the last month		
CR.4	In a typical week in the last month, how many times did [cropname] go?		
CR.5	How many hours did it take the last time [cropname] went to collect crop-residue, twigs and leaves in the last month? *Please record in hours.*		
Dung Cakes DC.1	Did you cook with Dung Cakes in the last month?	0 1	No => **Jump to LPG.1** Yes
DC.2	Did you buy any dung cakes in the last month?	0 1	No => **Jump to DC.5** Yes
DC.3	How many dung cakes did you purchase in the last month?		
DC.4	How much did you spend on dung cakes last month?		
DC.5	In a typical week in the last month, did you or anyone else in the household make dung cakes?	0 1	No => **Jump to LPG.1** Yes
DC.6	In a typical week in the last month, how many times did your household make dung cakes?		

DC.7	How many hours did it take the last time your household members made dung cakes? Please record in hours.		
DC.8	In the last month, did you or anyone else in the household collect dung?	0	No => **Jump to LPG.1**
		1	Yes
DC.9	In a typical week in the last month, how many times did your household go to collect dung?		
DC.10	How many hours did it take the last time your household members went to collect dung? *Please record in hours.*		
LPG LPG.1	Do you use a gas stove for cooking?	0	No => **Jump to OTH.1**
		1	Yes
LPG.2	When was the last time you used a gas stove for cooking?	1	Today
		2	Yesterday
		3	Last week
		4	Last month
		5	Two months back
		6	Three months back
		7	Six months back
		8	More than six months back
LPG.3	Generally, how do you get an LPG cylinder?	1	Book and delivered
		2	Book and pick up
		3	Just pick up from dealer
		99	Don't know/Can't say
		98	Other (specify)
LPG.4	Generally, how long does an LPG cylinder last?	1	Up to a month
		2	Up to two months
		3	Up to three months
		4	More than three months
		99	Don't know/Can't say
OTH.1	Apart from the fuels used, do you commonly use any other fuel for cooking?	0	No => **Jump to AW.1**
		1	Yes
OTH.2	What are these other fuels you use? *Please allow the respondent to give multiple answers*	1	Electric Stove
		2	Kerosene
		98	Other (specify)
HHD awareness	*Enumerator, please ask Primary Cook to show you the area where she usually cooks. Please make the following observations about this area.*		
AW.1	Does the house have a separate room which is exclusively used for cooking?	0	No
		1	Yes
AW.2	Is there a chimney/outlet for smoke?	0	No
		1	Yes
AW.3	Do you think that smoke from cooking with wood, dung or other traditional fuels has any adverse health effect on you and your family?	0	No
		1	Yes, it has short term effects

		2	Yes, it has long term effects
		99	Don't know/Can't say
AW.4 *This question is asked if AW.3 has option 1 or 2 as responses*	Can you tell me which of these adverse health effects can be caused or aggravated by inhaling smoke from the *chulha* in your children, you or other adults in the household?		
	For all diseases, 3 options available: No; Yes; Don't know/Can't say		
	Low birth weight		
	Pneumonia		
	Polio		
	Tuberculosis		
	Cataract		
	Heart disease		
	Diabetes		
	Anaemia		
	Lung Cancer		
AW.5	In the past three months, did you or any of your family members have any of the following medical check-ups?	1	Haemoglobin measurement to indicate anaemia
		2	Sugar level to indicate blood glucose/diabetes
		3	Dental screening
		97	None of the above
AW.6	According to you, which of the following food items are sources of iron?	1	Potatoes
		2	Jaggery
		3	Refined sugar
		4	Spinach
		5	Oranges
		97	None of the above
		99	Don't know/Can't say
AW.7	According to you, which of the following conditions can occur as a result of iodine deficiency?	1	Goitre
		2	Fatigue and weakness
		3	Fever
		4	Pregnancy complications
		5	Nausea
		97	None of the above
		99	Don't know/Can't say
Short-term Health	*This section asks whether any household members have cough, chest pain, eye irritation and/or breathing issues.*		
SAW.1	In last month, did any one (including you) in the household suffer from cough, chest pain, eye irritation or breathing issues?	0 1	No => **Jump to LAW.1** Yes
SAW.2_1	What is the name of household member? (Repeated group)		
SAW.3_1	Please select the type of illness. *Please allow the respondent to give multiple answers*	1	Cough
		2	Chest pain

		3	Eye irritation
		4	Breathing issues
		5	Pneumonia
		98	Other (Specify)
SAW.4_1	Total Treatment cost in the past month		
	Kindly fill in the above section for all those that have short term diseases.		
Long-term Health	Surveyor to ask for how many people in the household have had major morbidity such as tuberculosis, asthma, etc.		
LAW.1	Has anybody in the household been diagnosed with a long-term respiratory/lung disease like asthma, lung cancer, tuberculosis or COPD?	0 1	No => **Jump to ASHA.1** Yes
LAW.2_1	What is the name of household member?		
LAW.3_1	Please select the type of illness. *Please allow the respondent to give multiple answers*	1	Asthma
		2	Tuberculosis
		3	Lung cancer
		98	Other (Specify)
LAW.4_1	What was the total cost of treatment for this member in the past 12 months?		
	Kindly fill in the above section for all those that have long term diseases.		
ASHA.1	Government assigns an ASHA worker to every village. Does your village have an ASHA worker?	0	No => **Jump to S.1**
		1	Yes
		99	Don't know/Can't say
ASHA.2	Do you know about the primary responsibilities of ASHA worker?	0 1	No => **Jump to ASHA.4** Yes
ASHA.3	According to you, which of the following are the primary responsibilities of ASHA worker?	1	Provides health-related information
		2	Helps in getting Aadhaar card
		3	Helps in accessing health services for pregnant women
		4	Helps in getting NREGA job card
		98	Other (Specify)
ASHA.4	In the last month, how many times did the ASHA worker visit your neighbourhood?	0	She did not visit last month.
		1	Once
		2	Twice
		3	Thrice
		4	More than three times
		99	Don't know/Can't say
ASHA.5	Has the ASHA worker ever visited your house?	0	No
		1	Yes
		99	Don't know/Can't say
ASHA.6	In the last month, how many times did the ASHA worker visit your house?	0	She did not visit last month.
		1	Once
		2	Twice

		3	Thrice
		4	More than three times
		99	Don't know/Can't say
ASHA.7	Do you think ASHA worker provides correct health-related information?	1	No
		2	Yes, sometimes
		3	Yes, always
		99	Don't know/Can't say
SES	*This section asks the woman about the socio-economic conditions of the household.*		
S.1	Is your house provided or going to be provided as part of the Awas Yojana?	0	No
		1	Yes
		99	Don't know/Can't say
S.2	Does the household head have a bank account?	0	No
		1	Yes
		99	Don't know/Can't say
S.3	Do you have a bank account?	0	No
		1	Yes
S.4	Do you have your own mobile phone?		
S.5	What color is your ration card? *Enumerator, please confirm the color.*	1	Blue
		2	Green
		3	Yellow
		4	Pink
		5	White
		6	No Ration Card
		7	Refused to answer
		99	Don't know/Can't say
S.6	Enumerator, is the respondent able to show the ration card (*so you can confirm color*)?	0	No
		1	Yes
S.7	Does your family own this house?	0	No
		1	Yes
S.8	Number of rooms in the house. *(Count all rooms.)*		
S.9	Does your household own or lease any agricultural lands?	1	No
		2	Owns Only (and for own use)
		3	Leases Only
		4	Owns and Lease
S.10	What is the main source of water for drinking?	1	Piped water
		2	Well
		3	Rainwater
		4	Tanker truck
		5	Surface water (river, lake, pond, etc)
		6	Hand Pump
		98	Other (Specify)
S.11	What is your main sanitation facility?	1	No facility/open space

		2	Pit latrine
		3	Flush toilet
		98	Other (Specify)
S.12	What is the main source of lighting in your home?	1	Electricity
		2	Kerosene
		99	Don't know/Can't say
		98	Other (Specify)
S.13	Which of the following assets does the household own? *Please allow the respondent to give multiple answers*	1	Pressure cooker
		2	Cooler
		3	Television
		4	Sewing machine
		5	Refrigerator
		6	Watch/clock
		7	Bicycle
		8	Scooter/motorcycle
		9	Animal-drawn cart
		10	Car
		11	Water pump
		12	Thresher
		13	Tractor
		97	None of the above
S.14	Which of the following animals does the household own?	1	Cow/bull/buffalo
		2	Camel
		3	Horse/donkey/mule
		4	Goat
		5	Sheep
		6	Chicken/duck
		97	None of the above
Time Use	*Please try to ensure that the respondent is isolated for the remaining interview.* *This section collects information on how the primary cook spent the most recent typical day. First, ask her about yesterday, whether it was an atypical day (feast, festival, travel, holiday, family emergency). If it was, then ask her about the day before yesterday. If that was also an atypical day, then her about the day before that, and so on.* *For now, enter information in the time-use sheet, take photos of the sheets, and record this information in the tablet at the end of the interview. Please take a picture of all three (morning, noon, and night) time sheets. Start the conversation this way: "I want to know what you did yesterday from rising in the morning to sleeping at night. What time did you get up tomorrow, what is the first thing you did? ... "*		
TUS	**Time Use Data Collected on 24-hr recall format** **(TIME SHEET attached)**		
	This section collects information on food cooked by the primary cook yesterday. If she did no cooking yesterday, ask her these questions on food cooked on the most recent day. Repeated for all meals in the day		
TUS.1_1	Name of the food item for [timecooked]	1	Dal

		2	Rice
		3	Sabzi
		4	Roti
		5	Tea
		98	Other (Specify)
TUS.2_1	Fuel used	1	Chulha
		2	LPG
		3	Electric induction/heater stove
		98	Other (Specify)
	Kindly fill the above section for all meals in a day.		
Last meal	*For the questions in this section, ask the primary cook to recall the most recent main meal that she cooked in the last twenty-four hours. Begin by asking her whether she prepared a meal last evening. If she did, then continue to ask her the following questions on last evening's meal. If she did not, then go on to ask these questions on yesterday's morning meal. If she did not cook at all yesterday, then ask her to recall the most recent main meal that she prepared. Refer to the previous question to confirm that she is referring to the most recent main meal.*		
LM.1	Which fuel did you use to prepare this meal? *Please allow the respondent to give multiple answers.*	1	Chulha
		2	LPG
		3	Electric induction/heater stove
		98	Other (Specify)
LM.2	How much time did it take to prepare this meal? *Please record time in minutes.*		
LM.3	How much would it have taken if you had used only chulha? *Please record time in minutes.*		
LM.4	How much would it have taken if you had used only LPG? *Please record time in minutes.*		
LM.5	Were you alone when you were cooking?	0 1	No Yes
LM.6	Who was with you when you were cooking? *Please allow the respondent to give multiple answers.*	1	Husband
		2	Son
		3	Daughter
		4	Mother-in-law
		5	Father-in-law
		6	Sister-in-law
		7	Brother-in-law
		8	Female relative
		9	Male relative
		10	Friend/neighbor
		98	Other (Specify)

State of Mind	*In this section, please ask the primary cook about her state of mind when she was cooking this meal. You will be shown an emoji scale and based on her responses, you have to mark the most appropriate emoji. Please note that as you move from left to right on the emoji scale, the intensity of the emotion being discussed increases.* *What follows next are two questions which are not related to our study but are asked solely for the purpose of helping the respondent express her feelings in a given situation.*	
SM_Ex 1	You probably feel happy when you get a new sari. Which of these faces correctly reflects how strong your feeling of happiness is?	1: Not felt at all; 2: Felt slightly; 3: Felt moderately; 4: Felt strongly; 5: Felt very strongly
	1. 2. 3. 4. 5.	
SM_Ex2	You probably feel unhappy if a new sari gets torn badly. Which of these faces correctly reflects how strong your feeling of unhappiness is?	1: Not felt at all; 2: Felt slightly; 3: Felt moderately; 4: Felt strongly; 5: Felt very strongly
	1. 2. 3. 4. 5.	
SM	*The following set of questions are about the respondent's feelings during the preparation of this meal.*	
	Felt impatient for it to end	1.Not at all; to 5. Very strongly
	1. 2. 3. 4. 5.	
	Felt happy	1.Not at all; to 5. Very strongly
	1. 2. 3. 4. 5.	
	Felt frustrated	1.Not at all; to 5. Very strongly
	1. 2. 3. 4. 5.	
	Felt capable/competent	1.Not at all; to 5. Very strongly
	1. 2. 3. 4. 5.	
	Felt content	1.Not at all; to 5. Very strongly
	1. 2. 3. 4. 5.	

	Felt tired		1.Not at all; to 5. Very strongly
	1. 2. 3. 4. 5.		
Gender Relations	*This section asks the woman about some key decision-making within the household. She can give any combination of responses to these questions. For example: she makes the decisions alone, husband alone makes the decision, she makes them with her husband and senior female, etc.*		
G	*Please tell me who in your family decides the following? For instance, does someone alone or some members together decide: Please allow the respondent to give multiple answers*		
G.1	What to cook on a daily basis?	1	Respondent
		2	Husband
		3	Senior Male
		4	Senior Female
		98	Other (Specify)
G.2	Whether to buy an expensive item such as TV or fridge?	1	Respondent
		2	Husband
		3	Senior Male
		4	Senior Female
		98	Other (Specify)
G.3	What to do if you fall sick?	1	Respondent
		2	Husband
		3	Senior Male
		4	Senior Female
		98	Other (Specify)
G.4	What to do if your child falls ill? *Skip if respondent is not a mother.*	1	Respondent
		2	Husband
		3	Senior Male
		4	Senior Female
		98	Other (Specify)
Please thank the respondent for the interview.			
Surveyor observations: *This section is to be filled only based on your observation. Do not ask these questions.*			
OBS.1	What is the material of the walls?	1	Grass/thatch/bamboo
		2	Plastic/polythene
		3	Mud/unburnt brick
		4	Wood
		5	Stone not packed with mortar
		6	Stone packed with mortar
		7	G.I./metal/asbestos sheets
		8	Burnt brick
		9	Concrete
		98	Other (Specify)
OBS.2	What is the material of the roof?	1	Grass/thatch/bamboo/wood/mud/etc.

		2	Plastic/polythene
		3	Hand made tiles
		4	Machine made tile
		5	Burnt brick
		6	Stone
		7	Slate
		8	G.I./metal/asbestos sheets
		9	Concrete
		98	Other (Specify)
OBS.3	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
OBS.4	Please indicate the areas of difficulty		
OBS.5	Was the respondent alone when you asked her questions about her state of mind while cooking?	0 1	No Yes
OBS.6	Please give your opinion about household's economic status:	1	Very Poor
		2	Below Average
		3	Average
		4	Above Average
		5	Rich
GPS	*With clear view of the sky, please stand at the entrance of the house. Please wait at least 2 minutes before noting the GPS. GPS measurement should be within 100 metres.*		
GPS.1	Record GPS Reading 1		
GPS.2	Record GPS Reading 2		
GPS.3	*Please describe the nearest landmark to the respondent's house (such as a water tank) so that we can easily find this house again.*		

Appendix. C   Instructions to ASHA workers

Block/Janpad: _____   Village: _____

LPG and Health Benefits

ASHA Training Manual

Health [and Subsidy]* Information

"LPG Family, Healthy Family"

[ ]* *included in heath and subsidy (H+S) treatment only*

Table of Contents

Project Details

Namaste! Thank you for taking part in this training.

Prof. Farzana Afridi, Prof. E. Somanathan (Indian Statistical Institute) and Prof. Sisir Debnath (ISB, Hyderabad), with the support of administration of Indore District, are conducting a research project. The objective of this project is to increase awareness of households towards use of cooking fuels and its impact on health and welfare.

Smoke, particulate matter and other pollutants in biomass smoke can adversely affect the health of all members of a household. Our objective is: that all members of the household become aware of the harmful effects of smoke and the diseases it causes. All members of the household should be informed so that they stop using biomass and instead switch to LPG completely.

To this objective, your role is to provide to all household members, especially the male members, the following [two]* information

1. Information regarding harmful effects of smoke. This information would be given through videos and multimedia. This information booklet contains all details regarding your visits to household.

[2. Information regarding subsidy on LPG cylinder refills given by Government.]*

First we will inform you about the harmful effects of smoke from biomass. Following that we will give you information on how to proceed with household visits.

Harmful effects of indoor air pollution (smoke)

Indoor air pollution affects all members of the household. The smoke from biomass and particulate matter can cause the following 4 types of diseases.

1. Respiratory Diseases
a. Pneumonia

Smoke damages the lung's ability to fight off infection, and smokers have been found to be at higher risk of getting pneumonia. As in the case of smoking tobacco, those who use traditional chulha are at risk of getting pneumonia. Smoke, particulate matter and other pollutants in biomass smoke reduces the capacity of the blood to carry oxygen to the body tissues of all household members exposed to the smoke.

Complications due to pneumonia can prove fatal. About half the children who survive pneumonia are left with some type of after-effect. These after-effects may be mild or temporary and may improve with time, but 22% of the survivors end up with a moderate or severe disability. Complications of untreated or neglected pneumonia can result in disabilities such as deafness, brain damage, seizures and in some cases even death.

Pneumonia symptoms can vary from mild to severe, depending on the type of pneumonia you have, your age and health.

The most *common symptoms* of pneumonia are:
- Cough (with some pneumonias you may cough up greenish or yellow mucus, or even bloody mucus)
- Fever, which may be mild or high
- Shaking chills
- Shortness of breath, which may only occur when you climb stairs

Additional symptoms include:

- Sharp or stabbing chest pain that gets worse when you breathe deeply or cough
- Headache
- Excessive sweating and clammy skin
- Loss of appetite, low energy, and fatigue
- Confusion, especially in older people

b. Asthma

Smoke damages the lung's ability to fight off infection, and smokers have been found to be at higher risk of getting asthma. As in the case of smoking tobacco, those who use traditional chulha are at risk. Smoke, particulate matter and other pollutants in biomass smoke reduces the capacity of the blood to carry oxygen to the body tissues of all household members exposed to the smoke.

In childhood asthma, the lungs and airways become easily inflamed when exposed to certain triggers, such as smoke. Childhood asthma can cause bothersome daily symptoms that interfere

with play, sports, school and sleep. In some children, unmanaged asthma can cause dangerous asthma attacks.

Asthma may cause a number of complications, including:
- Severe asthma attacks that require emergency treatment or hospital care
- Permanent narrowing of the airways (bronchial tubes)
- Missed school days or getting behind in school
- Poor sleep and fatigue
- Symptoms that interfere with play, sports or other activities

Common asthma signs and symptoms include:

- Frequent, intermittent coughing
- A whistling or wheezing sound when exhaling
- Shortness of breath
- Chest congestion or tightness
- Chest pain, particularly in younger children

c. Tuberculosis-TB
The bacteria that cause TB are spread through the air from person to person when a person with TB disease coughs or speaks. People nearby may breathe in these bacteria and become infected. Some factors thought to be involved include exposure to environmental factors, such as cigarette smoke and smoke from traditional chulha.
If not treated properly, TB disease can be fatal.

Symptoms
TB bacteria most commonly grow in the lungs, and can cause symptoms such as:

- A bad cough that lasts 3 weeks or longer
- Pain in the chest
- Coughing up blood or sputum (mucus from deep inside the lungs)

Other symptoms of TB disease may include:

- Weakness or fatigue
- Weight loss
- No appetite
- Chills
- Fever
- Sweating at night

TB disease can be treated by taking medicine. It is very important that people who have TB disease are treated, finish the medicine, and take the drugs exactly as prescribed. If they stop taking the drugs too soon, they can become sick again; if they do not take the drugs correctly, the TB bacteria that are still alive may become resistant to those drugs. TB that is resistant to drugs is harder and more expensive to treat.

d. Lung Cancer
Smoking causes the majority of lung cancers and lung related diseases — both in smokers and in people exposed to second-hand smoke. Similarly, smoke, particulate matter and other pollutants in biomass smoke can cause lung cancer in people. If you stop using the chulha, even

after using it for many years, you can significantly reduce your chances of developing lung cancer.

Doctors believe smoking causes lung cancer by damaging the cells that line the lungs. When you inhale chulha smoke, which is full of cancer-causing substances (carcinogens), changes in the lung tissue begin almost immediately.

At first your body may be able to repair this damage. But with each repeated exposure, normal cells that line your lungs are increasingly damaged. Over time, the damage causes cells to act abnormally and eventually cancer may develop.

Symptoms

Lung cancer typically doesn't cause signs and symptoms in its earliest stages. Signs and symptoms of lung cancer typically occur only when the disease is advanced and may include.

- A new cough that doesn't go away
- Coughing up blood, even a small amount
- Shortness of breath
- Chest pain
- Hoarseness
- Losing weight without trying
- Bone pain
- Headache

2. Cardio-vascular diseases
a. High BP and Heart Stroke
Smoke from traditional chulha, like tobacco smoking, can be one cause of heart disease and death. High blood pressure is a "silent killer". Most of the time there are no obvious symptoms. Regularly inhaling smoke from the chulha can put you at a greater risk for high blood pressure. In most cases, the damage done by high blood pressure takes place over time. Left undetected (or uncontrolled), high blood pressure can lead to:

- Heart attack
- Stroke
- Heart Failure
- Kidney disease or failure
- Vision Loss

3. Eye diseases
a. Cataract
A cataract is a clouding of the eye's natural lens, which lies behind the iris and the pupil. Besides advancing age, smoking or smoke from traditional chulha is among the risk factors. Cataracts are the most common cause of vision loss in people over age 40 and is the principal cause of blindness in the world.

Symptoms:
Hazy, blurred vision may mean you have a cataract.
A cataract starts out small and at first has little effect on your vision. You may notice that your vision is blurred a little, like looking through a cloudy piece of glass. A cataract may make light from the sun or a lamp seem too bright or glaring. Or you may notice that at night the street lights cause more glare than before. Colors may not appear as bright as they once did.

4. Other diseases
a. Low-birthweight/still births

Medical research has found lower birth weight in children of mothers with higher exposure to indoor smoke and higher chances of still-births.
Like tobacco smoke, burning biomass in poorly vented space produces large volumes of smoke which reduces the capacity of the blood to carry oxygen to the body. A developing foetus, deprived of adequate oxygen, suffers growth retardation and increased risk of mortality. Particulate matter and other pollutants in biomass smoke can also increase the risk of an adverse pregnancy outcome by reducing the mother's lung function and increasing the risk of maternal chronic and acute respiratory disease, which also reduces oxygen delivery to the foetus.

Long-term effects of low-birth weight:

Children with lower birth-weight have higher rates of health and developmental challenges than normal birth weight children. Besides neurological disorders, they may experience a number of long-term adverse outcomes, including limited academic skills, poor vision, poor motor skills and other chronic health challenges, such as asthma and cerebral palsy.

Instructions for Household Visit

Medical research has shown that indoor air pollution caused by smoke from biomass can cause diseases. These diseases can affect all members of the house, especially women and children. All member of the household should be informed about this so they stop using biomass and instead shift to LPG entirely.

You have been given a roster of 20 households. From January to March, you would have to visit each house 3 times. Each visit would be after a period of approximately 30 days, i.e., you would have to revisit each house after 30 days. After the first 3 visits, we will reinitiate the household visits after a couple of months. In total there would be 6 visits as per the schedule mentioned below:

Visit number	Dates	Description
1	5-15 January 2019	ASHA Script, Comic Book, Video 1+ Calendar
2	1-15 February 2019	ASHA Script, Video 2
3	1-15 March 2019	ASHA Script, Video 3
4	1-15 June 2019	ASHA Script, Video 1
5	15-30 August 2019	ASHA Script
6	15-30 September 2019	ASHA Script

We will provide a list of 20 households of your village. The list contains address of household, name and mobile number of household head, and details of some members of the household. If the information in the roster does not match the household, kindly contact at the number below.

Pranav Mimani: 783XXXXXXX

ASHA Script

Visit 1

Introduction:

Namaste, I am the ASHA worker of your village. My name is……..

Today, I have come to speak with you on a very important issue which is related to you and your family members' health.

Instructions: Cross-check household composition with provided roster to ensure this is the target family.

Can you tell me how many members are there in your family? Are there any children in your family? Does your father or mother-in-law stay here with you?

Please ask your husband and other members to join our conversation if they are available.

Instructions: Please probe members to determine who is the main cook of the household. Request woman cook and family to show you the kitchen and utensils. Note if the cooking utensils have black bottom and if the ceiling is covered with a layer of soot. Have remaining interaction in/around the kitchen. Then ask the main cook the following question first followed by the cook's husband and one other older (senior) household member.

Does your household use traditional chulha often for cooking?

How do you feel when you breathe the smoke from the chulha? Or how does smoke affect your eyes and throat? (Wait for answer)

Instructions: If the utensils are black and the ceiling is covered with soot then point to the black utensils and ceiling and say:

See your black pots and the black ceiling of your kitchen. The smoke from the chulha does the same to the your and your children's lungs and can have related permanent adverse health effects.

Multimedia Attachment:

I would like to show you a comic book video in which a household is discussing cooking.

Instructions: Show the comic book video to woman cook, husband and any other older members of the family.

Discussion on the comic video:

Do you ever converse similar to the video in your house? (Wait for an answer)

Video1:

I would now like to show you a short video about the harmful effects of chulha smoke.

Instruction: Show video to woman cook, husband and any other older household member present.

POST DISCUSSION:

Did you understand what the doctor was trying to tell you in the video? Ask the main cook, her husband and the older household member their views on the video.

Instructions: Allow them some time to respond to your question and let them explain their thoughts. Then reiterate the message from the video.

In the video you saw the doctor telling you that smoke from the chulha can have permanent bad effects on the health of all members of your family - your child(ren) and you.

As the doctor mentioned, the smoke from the chulha is the most damaging to children because the young breathe faster so they breathe in more of the black smoke inside the house too – their lungs and bodies are still developing to fight disease. Smoke from chulha can cause asthma, TB and other problems as they grow older and also affect you and other adults in the house. Some of these damages are permanent and the costs to cure these diseases are very high.

Instructions: Please probe if there are (1) new born babies or pregnant women in the house (2) anyone diagnosed with TB (3) diagnosed with vision problem/cataract (4) lung cancer
Does anyone in your family show the symptoms mentioned by the doctor in the video?
Specifically - is anyone in your family pregnant, does any child have difficulty breathing………?
Instruction: Please note down any specific health issue due to chulha smoke.
Have you obtained any medical help for THIS health issue?

You should also go to the NEAREST PHC/CHC for health check-up with a doctor to address THIS health issue.

Subsidy information*

Do you have an LPG connection?

IF YES
I would like to inform you that the government gives a subsidy which reduces the cost you have to bear of a gas cylinder.
When you buy a refill from the market you pay Rs. 820 to the dealer at the time of delivery of the 14.2 kg cylinder. The dealer enters the refill purchase against your consumer ID. This information is received by the government which then sends Rs. 320 to your linked bank account. The information about this transfer amount will come to you as a message in English from your bank within 5 days of the refill purchase if your phone number is registered in the system. So, the cost to you of the refill is Rs. 500.

The government subsidises 12 cylinders of 14.2-kg each per household in a year by providing the subsidy amount directly in your bank account. This scheme is applicable to all customers (Ujjwala and non-Ujjwala). Your monthly cost of fuel for cooking will be around Rs. 500 only.

If no:
If your name is in the SECC list or you are a BPL family AND SC/ST, have yellow ration card (AAY) or a beneficiary of the Awas Yojana then your cost of getting an LPG connection is also lower by Rs. 1500-1600 because you don't have to pay the security deposit and other connection charges. In addition, the dealer can also give you a loan to cover the cost of gas stove and first cylinder (about Rs. 1500-1600).

Remember, because of the refill subsidy your monthly cost of refill will be about Rs. 500 only, i.e., per day cost of maintaining your family's health is approximately 20.
Remember, the only solution to avoiding diseases from smoke of biomass is to stop use of biomass as cooking fuel and instead switch to LPG.

I would like to put up this photo of a happy and healthy family that cooks only on LPG on your kitchen wall.
I will meet you again in a few weeks. Thank you for your time.

End of Visit 1

Visit 2

Introduction:
Namaste, I am the ASHA worker of your village. My name is……..

Today, I have come to speak with you on a very important issue which is related to you and your family members' health.
Hope all is well with you and your family since my last visit.
Please ask your husband and other members to join our conversation if they are available.
VIDEO 2:

I would now like to show you another short video about the harmful effects of chulha smoke.
Instructions: Show video to woman cook, husband and any other older household member present

POST DISCUSSION:
In the video you saw the doctor telling you that smoke from the chulha can have permanent bad effects on the health of all members of your family - your child(ren) and you.
As the doctor mentioned, the smoke from the chulha is the most damaging to children because the young breathe faster so they breathe in more of the black smoke inside the house too – their lungs and bodies are still developing to fight disease. Smoke from chulha can cause asthma, TB and other problems as they grow older and also affect you and other adults in the house. Some of these damages are permanent and the costs to cure these diseases are very high.

Instructions: If there is any specific smoke related illness in the family that you had noted down in previous visit please discuss material related to that specific disease.
In our last meeting you had mentioned that "NAME" is suffering from "DISEASE", e.g. TB

TB is a disease that spreads through the air from person to person. If not treated properly, TB disease can be fatal.
TB bacteria most commonly grow in the lungs, and can cause symptoms such as:
- A bad cough that lasts 3 weeks or longer
- Pain in the chest
- Coughing up blood or sputum (mucus from deep inside the lungs)

Other symptoms of TB disease may include:
- Weakness or fatigue
- Weight loss
- No appetite
- Chills
- Fever
- Sweating at night

TB disease can be treated by taking medicine. It is very important that people who have TB disease are treated, finish the medicine, and take the drugs exactly as prescribed. If they stop taking the drugs too soon, they can become sick again; if they do not take the drugs correctly, the TB bacteria that are still alive may become resistant to those drugs.
You should also go to the NEAREST PHC/CHC for health check-up with a doctor to address THIS health issue

Remember, the only permanent solution to avoid these health effects is to stop using the chulha completely for cooking and shift to LPG cylinder totally.
I will meet you again in a few weeks. Thank you for your time.

Subsidy Information*

Reminder for financial information:
In my last visit I had mentioned to you that the cost of purchasing a cylinder refill is subsidized by the government…….

Remember, because of the refill subsidy your monthly cost of refill will be about Rs. 500 only, i.e., per day cost of maintaining your family's health is approximately 20.

Have you made a recent refill purchase?
(If yes), if your phone is registered did you receive a message about the deposit in your bank account?
Can I see your phone to read out any such message?

Or
Can I help you register your phone number to receive these messages in the future?
Remember, the only solution to avoiding diseases from smoke of biomass is to stop use of biomass as cooking fuel and instead switch to LPG.

I will meet you again in a few weeks. Thank you for your time.

End of Visit 2

Visit 3

Introduction:
Namaste, I am the ASHA worker of your village. My name is……..
Today, I have come to speak with you on a very important issue which is related to you and your family members' health.
Hope all is well with you and your family since my last visit.
Please ask your husband and other members to join our conversation if they are available.
VIDEO 3:
I would now like to show you another short video about the harmful effects of chulha smoke.
Instructions: Show video to woman cook, husband and any other older household member present

POST DISCUSSION:
In the video you saw the doctor telling you that smoke from the chulha can have permanent bad effects on the health of all members of your family - your child(ren) and you.
As the doctor mentioned, the smoke from the chulha is the most damaging to children because the young breathe faster so they breathe in more of the black smoke inside the house too – their lungs and bodies are still developing to fight disease. Smoke from chulha can cause asthma, TB and other problems as they grow older and also affect you and other adults in the house. Some of these damages are permanent and the costs to cure these diseases are very high.

Instructions: If there is any specific smoke related illness in the family that you had noted down in previous visit please discuss material related to that specific disease.
In our last meeting you had mentioned that "NAME" is suffering from "DISEASE", e.g. TB

You should also go to the NEAREST PHC/CHC for health check-up with a doctor to address THIS health issue
Remember, the only permanent solution to avoid these health effects is to stop using the chulha completely for cooking and shift to LPG cylinder totally.
I will meet you again in a few weeks. Thank you for your time.

Subsidy Information*

Reminder for financial information:
In my last visit I had mentioned to you that the cost of purchasing a cylinder refill is subsidized by the government…….

Remember, because of the refill subsidy your monthly cost of refill will be about Rs. 500 only, i.e., per day cost of maintaining your family's health is approximately 20.

Have you made a recent refill purchase?
(If yes), if your phone is registered did you receive a message about the deposit in your bank account?
Can I see your phone to read out any such message?

Or
Can I help you register your phone number to receive these messages in the future?
Remember, the only solution to avoiding diseases from smoke of biomass is to stop use of biomass as cooking fuel and instead switch to LPG.

I will meet you again in a few weeks. Thank you for your time.

End of visit 3

Visit 4

Namaste, I am the ASHA worker of your village. My name is……..
Today, I have come to speak with you on a very important issue which is related to you and your family members' health.
Hope all is well with you and your family since my last visit.
Video 1, 2, 3 and Comic Book:
I would now like to show you some short videos about the harmful effects of chulha smoke.
Instructions: Show video to woman cook, husband and any other older household member present
Discussion: In the video you saw the doctor telling you that smoke from the chulha can have permanent bad effects on the health of all members of your family - your child(ren) and you.

Is there ill because of cold or cough? (Wait for answer)
Have you got any medical assistance for this?

You should also go to the NEAREST PHC/CHC for health check-up with a doctor to address THIS health issue

Subsidy Information*

Reminder for financial information:
In my last visit I had mentioned to you that the cost of purchasing a cylinder refill is subsidized by the government…….

Remember, because of the refill subsidy your monthly cost of refill will be about Rs. 500 only, i.e., per day cost of maintaining your family's health is approximately 20.

Have you made a recent refill purchase?
(If yes), if your phone is registered did you receive a message about the deposit in your bank account?
Can I see your phone to read out any such message?

Or
Can I help you register your phone number to receive these messages in the future?
Remember, the only solution to avoiding diseases from smoke of biomass is to stop use of biomass as cooking fuel and instead switch to LPG.

I will meet you again in a few weeks. Thank you for your time.

End of Visit 4

Visit 5

Namaste, I am the ASHA worker of your village. My name is……..
Today, I have come to speak with you on a very important issue which is related to you and your family members' health.
Hope all is well with you and your family since my last visit.
Instructions: In this visit talk about the diseases previously discussed with the members of the household.

In our last meeting you had mentioned that "NAME" is suffering from "DISEASE", e.g. TB
Have you taken them to a PHC/CHC recently?

Subsidy Information*

Reminder for financial information:
In my last visit I had mentioned to you that the cost of purchasing a cylinder refill is subsidized by the government…….

Remember, because of the refill subsidy your monthly cost of refill will be about Rs. 500 only, i.e., per day cost of maintaining your family's health is approximately 20.

Have you made a recent refill purchase?
(If yes), if your phone is registered did you receive a message about the deposit in your bank account?
Can I see your phone to read out any such message?

Or
Can I help you register your phone number to receive these messages in the future?
Remember, the only solution to avoiding diseases from smoke of biomass is to stop use of biomass as cooking fuel and instead switch to LPG.

I will meet you again in a few weeks. Thank you for your time.

End of Visit 5

Visit 6

Namaste, I am the ASHA worker of your village. My name is……..
Today, I have come to speak with you on a very important issue which is related to you and your family members' health.
Hope all is well with you and your family since my last visit.
Instructions: In this visit talk about the diseases previously discussed with the members of the household.

In our last meeting you had mentioned that "NAME" is suffering from "DISEASE", e.g. TB
Have you taken them to a PHC/CHC recently?

Subsidy Information*

Reminder for financial information:
In my last visit I had mentioned to you that the cost of purchasing a cylinder refill is subsidized by the government…….

Remember, because of the refill subsidy your monthly cost of refill will be about Rs. 500 only, i.e., per day cost of maintaining your family's health is approximately 20.

Have you made a recent refill purchase?
(If yes), if your phone is registered did you receive a message about the deposit in your bank account?
Can I see your phone to read out any such message?

Or
Can I help you register your phone number to receive these messages in the future?
Remember, the only solution to avoiding diseases from smoke of biomass is to stop use of biomass as cooking fuel and instead switch to LPG.

I will meet you again in a few weeks. Thank you for your time.

End of Visit 6

Frequently asked questions

Some questions that households or women will have for the ASHA worker:

1. What about you? Do you use a chulha or do you use only gas?
ASHA Response: Only gas, since I learnt about the harmful effects of the chulha.

2. We can't afford to buy more cylinders than we're doing now or My husband doesn't want to spend money on LPG cylinder.
ASHA Response: It'll be even more money going to the hospital to get treatment for pneumonia or TB or cancer. Can you afford to let your children/in-laws/husband/yourself get sick? Don't risk your family's lives and health.

3. Everyone here has always cooked on chulha and we're still OK.
ASHA Response: We all know children with pneumonia, adults with breathing difficulties. So many of us are not OK. Today you may be OK, but tomorrow you may not be so lucky if you continue to cook on the chulha.

4. We can't always get a cylinder quickly when one runs out, so we have to cook on the chulha for a few days.
ASHA Response: You can use an electric induction stove with compatible vessels. They're available in the market.

5. Rotis taste better on the chulha.
ASHA Response: You'll soon get used to the taste of rotis cooked on gas and won't notice the difference.

6. The chulha keeps us warm in winter.
ASHA Response: You can buy an electric heater instead.

7. Firewood is free for us as the jungle is nearby, we have a cow/buffalo and therefore kandas do not cost us anything either.
ASHA Response: Firewood or dungcakes might be free for you but there are chances of very high expenditure on healthcare if you continue cooking with them for a prolonged period.

8. My husband told me that LPG cylinders can burst. I have small children in the house and I cannot take such risks.
ASHA Response: Any source of fire can be potentially dangerous and LPG is no exception. However, you can exercise the following safety tips to minimize the risks. Your local LPG dealer will advise on safety measures.

9. I have applied for a connection under Ujjwala. All my neighbors got the connection. I did not. Could you help?
ASHA Response: Here is a poster with some eligibility details. Please contact your local dealer to determine your eligibility and required documents.

10. I am not used to LPG gas stove. This is new to me.

ASHA Response: It may take some time to get used to the new method of cooking. But LPG is easy to control with instant on and off activation at the twist of a knob offering better control over cooking. LPG can cook faster compared to any other traditional fuels. Apart from a smoke free cooking environment, other benefits include low kitchen temperature, cleaner utensils, does not leave ash and soot residues.

11. Could you please help me get a refill? I do not know how to book a cylinder.
ASHA Response: Please follow this process to book a refill…..

How to obtain an L.P.G. connection*

The process of obtaining an LPG connection is outlined below:

Eligibility for Ujjwala (PMUY) connection:
<div align="center">Name in SECC 2011 list
or</div>

a) BPL + SC/ST household
b) BPL + AAY (Antayodaya Ann Yojana) beneficiary
c) BPL + PMAY (Pradhan Mantri Awas Yojana (Gramin)) beneficiary

Documents required for LPG Connection:

Non-Ujjwala Connection: A copy of Aadhaar and Bank Passbook.

Ujjwala Connection:

a) Aadhaar (of a female member and any other member of household)
b) Proof of Bank a/c of the female member
c) BPL ration card
d) KYC form

Some documents are important for different categories

Category	Documents
SC/ST	Caste certificate of female Online/offline verification of caste certificate
Antayodaya Ann Yojana (AAY) or BPL	Yellow Ration Card Name of female member on the ration card is necessary· Online verification / Verification by food department

Pradhan Mantri Awas Yojana (Gramin)(PMAY)	AHL TIN NO. of the female member is necessary Connection would be given under the name of female member only.

Phone Registration and Booking*

Any consumer with LPG connection can book an LPG refill from home. This can be done in 3 ways:
· Through IVRS numbers
· Through SMS
· Through direct contact with LPG dealer on their landline numbers

Apart from these LPG consumers can book an LPG refill at the shop of the LPG dealer.
For booking LPG refills via IVRS or SMS, the information is provided below as per Oil Marketing Companies processes:

Indian Oil Corporation Limited (IOCL)
IVRS:
Dial the number **9669124365** and follow the next automated steps:

IVRS booking has two language option: 1. Hindi; 2. English

Press 1 for Hindi

Press digits of the agency phone number along *with* the STD code. For example, if dealer landline number is 269573 and STD code is 07321, then press 07321269573

To confirm press 1

Press the digits of consumer number

To confirm press 1

For refill booking press 1

Confirmation of booking will be sent to the registered mobile of the LPG consumer through SMS.

SMS:
For SMS booking, it is important that the mobile number of LPG consumer is registered with the oil marketing company. First time users of SMS booking system should:
Type: **IOC** <STD + Dealer's Landline Number ><Consume Code>and send the SMS to **9669124365.**

Example: If dealer landline number is 269573 and STD code is 07321, and consumer code is 12468970 then, type
IOC 7321269573 12468970
And send SMS to **9669124365**

Once consumer's mobile number is registered, to book an LPG refill,
Type: **IOC** and send SMS to **9669124365**

Subsidy: After 2-3 days of refill delivery, the subsidy amount will be transferred to the bank account of consumer. If the mobile number of consumer is registered, there will be a notification from the bank as well. For example,

"Subsidy amount of Rs. 322.44 is transferred to your bank a/c by IOCL under DBTL Scheme for LPG cylinder delivered by cash memo 37737 of 01/08/2018."

Hindustan Petroleum (HPCL)
IVRS:
Hindustan Petroleum (HPCL) consumers dial **9669023456** and follow the instructions therein
· IVRS booking has two language option: 1. Hindi; 2. English
Press 1 for Hindi

Press digits of the agency phone number. For example, if dealer landline number is 269573, then press 269573

Press the digits of consumer code

To confirm press 1

For refill booking press 1

If the phone number of consumer is to be registered, then press 1

Confirmation of booking will be sent to the registered mobile of the LPG consumer through SMS.

If the phone number of consumer is already registered, then for IVRS booking, dial **9669023456** and follow the instructions

Press 1 to consumer code·
For refill booking press 1

Confirmation of booking will be sent to the registered mobile of the LPG consumer through SMS.

SMS:
For SMS booking, it is necessary that the phone number of consumer is registered. For those using SMS booking system for first time,
Type: **HP**<STD code +Dealer's number> <consumer number> and send it to **9669023456**.

Example: If dealer landline number is 269573 and STD code is 07321, and consumer code is 12468970 then, type HP 7321269573 12468970
And send SMS to **9669023456**

Once consumer's mobile number is registered, to book an LPG refill,
Type: **HPGAS** and send SMS to **9669023456**

Subsidy: After 2-3 days of refill delivery, the subsidy amount will be transferred to the bank account of consumer. If the mobile number of consumer is registered, there will be a notification from the bank as well. For example,

"Subsidy amount of Rs. 322.44 is transferred to your bank a/c by HPCL under DBTL Scheme for LPG cylinder delivered by cash memo 37737 of 01/08/2018."

Bharat Petroleum (BPCL)

To use IVRS or SMS booking system of BPCL, it is mandatory to have the phone number of consumer registered. This registration of phone number is done through KYC form available with the dealer.

IVRS:

If the phone number of consumer is already registered, then for IVRS booking, dial **77151012345 or 7718012345** and follow the instructions

For refill booking press 1

Confirmation of booking will be sent to the registered mobile of the LPG consumer through SMS.

SMS:

For SMS booking, it is necessary that the phone number of consumer is registered. This registration of phone number is done through KYC form available with the dealer.
Once consumer's mobile number is registered, to book an LPG refill,

Type: **LPG** and send SMS to **7715012345** or **7718012345.**

Subsidy: After 2-3 days of refill delivery, the subsidy amount will be transferred to the bank account of consumer. If the mobile number of consumer is registered, there will be a notification from the bank as well. For example,

"Subsidy amount of Rs. 322.44 is transferred to your bank a/c by BPCL under DBTL Scheme for LPG cylinder delivered by cash memo 37737 of 01/08/2018."