

Nudging Households to Increase the Usage of Clean Fuel

Executive summary

The gender gap in time use – especially related to cooking and fuel collection – constrains women’s participation in remunerative activities. The *Pradhan Mantri Ujjwala Yojana (PMUY)*, which seeks to expand access to clean fuel among rural Indian households, has the potential to significantly reduce women’s time spent on domestic chores as well as improve their long-term health. While millions of LPG (liquefied petroleum gas) connections have been released under the scheme, it is seen that a large fraction of beneficiaries has very low annual purchase of refills of the cylinder after getting the connection. By shedding light on the barriers that households face in switching from traditionally used solid fuels to LPG for cooking, this study seeks to inform various aspects of the design and implementation of the programme, hence, enhancing its effectiveness in achieving its objectives.

Introduction – context and rationale

Women’s participation in remunerative activities can be constrained by poverty and social factors, which include gendered time use – particularly those related to cooking and fuel collection. Saksena et al. (1995) studied three villages in Himalayas and found that women spent 4-6 hours in collection of solid fuels. Shailaja (2000) finds a disproportionate division of labour in that women collect over 56% fuel wood whereas they contribute way little to household income. The high utilisation of solid fuels also has greater adverse health impacts for women since they are exposed to these fuels much more than the men in the household. Take up of LPG for cooking may enable women to invest this saved time and effort in collecting solid fuel in more productive activities. An improved status for women in the household will result in cleaner fuel choices and better health outcomes – thereby creating positive feedback mechanisms (see Austin and Mejia 2017).

There is also evidence from other countries showing that improvements in home production technology increases women’s labour supply by saving time spent on domestic chores: for instance, Greenwood et al. (2005) looks at the advent of washing machines and refrigeration in developed countries, and Dinkelman (2011) analyses the effect of mass electrification of rural households in South Africa, in this context.

The PMUY – the largest program on access to clean fuel in India’s history – was launched in April 2016 with the aim to provide 50 million subsidised LPG (liquid petroleum gas) connections to women in the poorest families by March 2019. As of October 2019, about 80.3 million LPG connections have been released under the scheme. However, a large fraction of households with LPG connections (PMUY or non-PMUY) has either never purchased a refill of the cylinder after getting the connection or has low LPG usage annually.

While the government as well as oil marketing companies (OMCs) engage in outreach to encourage people to use LPG, they have not emphasised the health benefits of switching to modern cooking fuels from polluting solid fuels.

Brief description of the study

Overview

This study seeks to explore the barriers faced by rural households in switching from traditional cooking fuels to LPG; inform them of adverse health effects of solid fuel usage and financial incentive¹ (irrespective of the nature of their LPG connection, that is PMUY or non-PMUY and status); assess the impact of this information campaign on LPG take-up and utilisation; and examine the impact of the switch on households’ self-reported health and time use of women.

The findings may be used as inputs into the design of an information campaign of the Ministry of Petroleum and Natural Gas for greater dissemination of knowledge of benefits of clean air on households’ and women’s welfare.

The project is based in rural Madhya Pradesh as there is significant variation across the state in households’ access to firewood as an alternative fuel source. Three thousand households across 150 randomly sampled villages of these blocks are part of the study.

¹ When someone with an LPG connection buys a cylinder refill from one of the three State-owned OMCs, they pay the market price to the dealer and receive a transfer from the company to their bank account for the amount of subsidy they are entitled to (direct benefit transfer; DBT). For PMUY beneficiaries, the security deposit for the cylinder and pressure regulator along with administrative charges, are borne by the government. The customer also receives a loan from the OMC for purchase of the stove and gas in the first cylinder. The loan is recovered by paying the DBT to the OMC instead of to the customer every time the customer gets a refill.

A survey of these villages was conducted in Indore during November-December 2018. In each village, 20 households were randomly sampled and surveyed regarding cooking fuel patterns, household characteristics, health expenditures, and time use of the primary cook. If the household had an LPG connection, the survey collected information about unique consumer and dealer identification codes and status using LPG consumer booklets assigned by respective OMCs. The LPG fuel consumption patterns for these households were mapped by counting the number of refill entries in the consumer booklets. Geographical location data was recoded for each household by using two GPS readings in front of the house.

A campaign is now being undertaken wherein information on the adverse health effects of indoor smoke is being provided by ASHA (Accredited Social Health Activist) workers. Additionally, in some randomly sampled villages, information on the government's LPG subsidy is also being given by ASHA workers.

These same households will be re-surveyed at the end of the information campaign in November-December 2019.

Data

The main source of the data is the primary survey, supplemented by data on LPG dealer locations and refill sales from OMCs for households that have an LPG connection. Geographical location data for LPG distributors was also obtained from the respective OMC.

Methodology

The study adopts a two-pronged approach in the evaluation of the impact of LPG on households' and women's welfare:

1. The study uses RCT (randomized controlled trial) design to examine the causal effect of switching to LPG cylinder and/or increasing LPG refill consumption on women's time use, household health, and well-being.
 - (a) Health: This is done using self-reported questionnaires and objective measures of respiratory disorders that are typically linked to indoor and outdoor air pollution. The study focuses on the health outcomes of women and children, in particular.

- (b) Women's time use and well-being: Women's participation in economic activities, including time poverty, is often used as a measure of female empowerment. One of the main objectives of the study is to use 24-hour recall to measure the effect of having LPG cylinders on women's utilisation of time, particularly on collecting firewood and cooking and its subsequent effects on the utilisation of the time released by women for other activities – leisure, childcare, and labour force participation, on both the extensive and intensive margins. We also devise survey methods to elicit the impact on women's sense of well-being as a result of LPG usage.
2. Using baseline data, the project designs a cluster-RCT to disseminate information obtained from (a) above on the health benefits of using LPG to randomly sampled households. Additionally, in some randomly sampled villages, information on the government's LPG subsidy is also given. The unit of randomisation is the village to ensure there is no spillover of information between households in the treatment and control groups. The aim is to use the existing networks of ASHA (Accredited social health activist) workers to disseminate information on the health benefits of LPG usage and the financial subsidy. The information campaign is conducted through visits to randomly selected households in the treatment villages using both pictorial and multimedia sources. An appropriate sample size of villages and households is determined to provide sufficient power in detecting impacts. The information campaign involves frequent (once a month) interactions with the women beneficiaries over a year (baseline information gathered in (1), midline, and an endline survey) and comparison of the response of women in households which were provided information vis-à-vis those that were not.

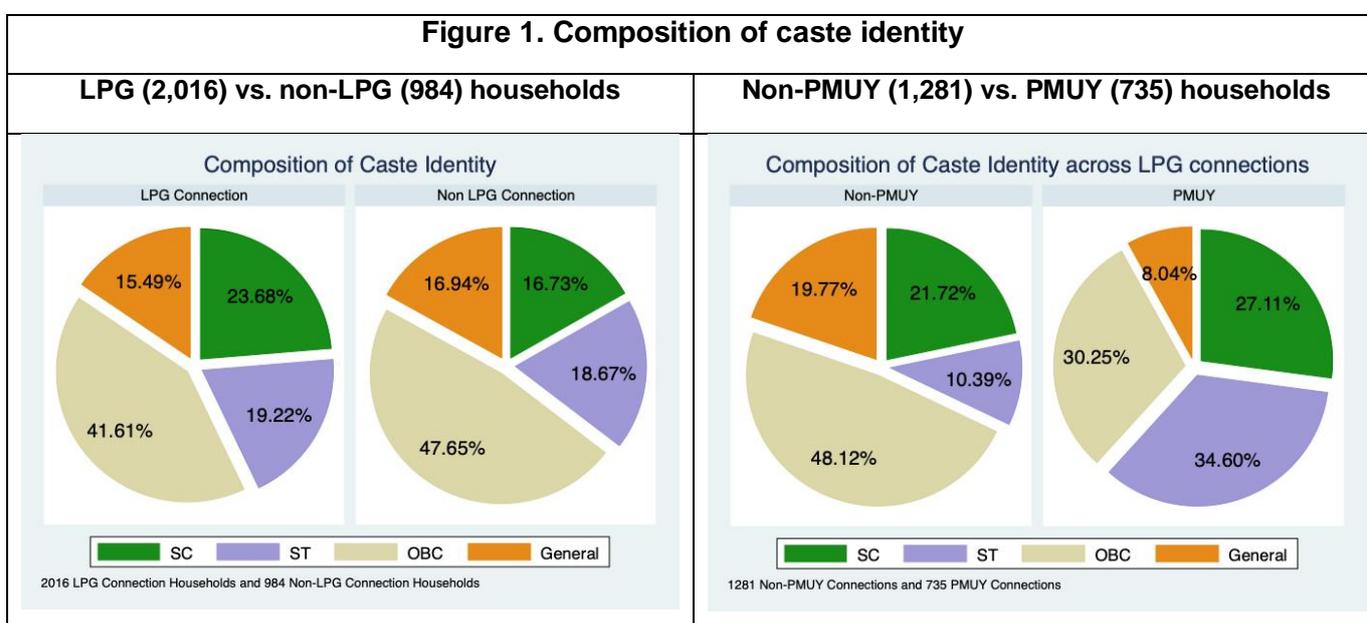
Major findings at baseline

The findings on LPG uptake are based on a comparison of household characteristics across non-LPG (984) and LPG (2,106) households, and across non-PMUY (1,281) and PMUY (735) households within LPG households. Non-LPG households are observed to be worse off than LPG households in terms of education, occupational stability, and the time they have to spend outside home for work. Similarly, PMUY households are worse off than non-PMUY households. Hence, financial constraints

and lack of education appear to be important determinants of LPG access and utilisation.

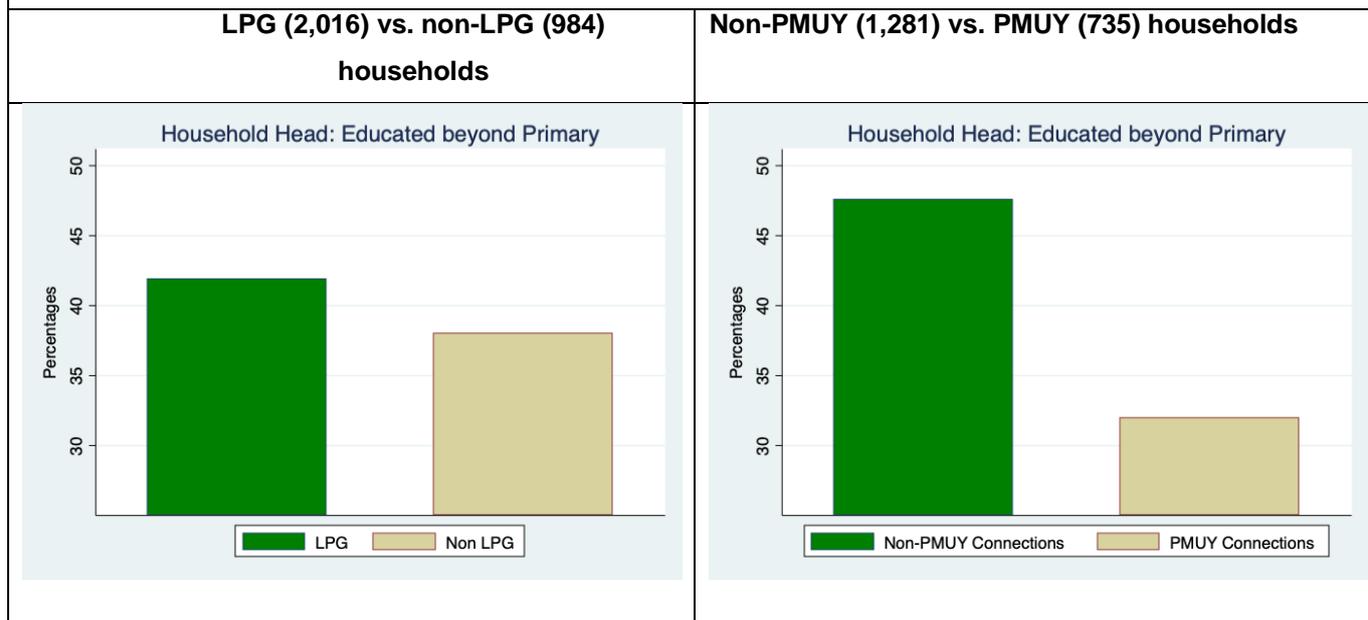
Demand-side factors: Household characteristics

- Caste composition under PMUY is significantly different from other groups, underlining targeted delivery as per programme guidelines. While in the overall sample of households, 40.5% belong to Scheduled Castes/Tribes (SC/STs), the corresponding figure for PMUY households is higher at 61.6%.



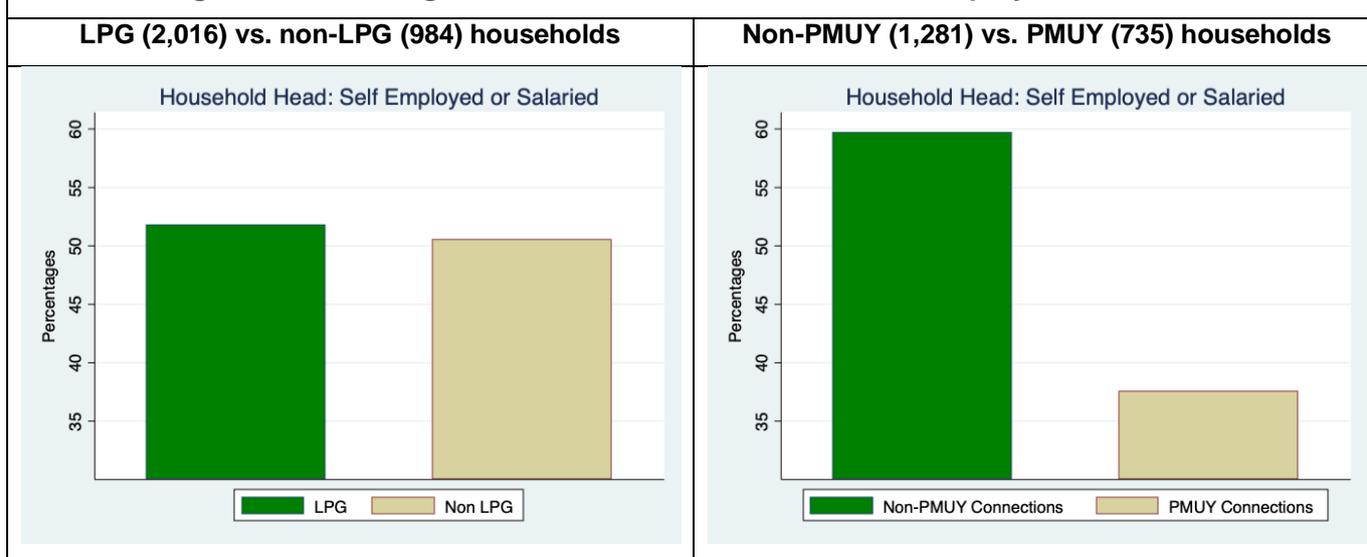
- LPG users – particularly non-PMUY ones – are better educated relative to PMUY or non-LPG households. Only 32% of PMUY households have the family head educated beyond primary school versus 47% for non-PMUY households.

Figure 2. Percentage of household heads educated beyond primary level



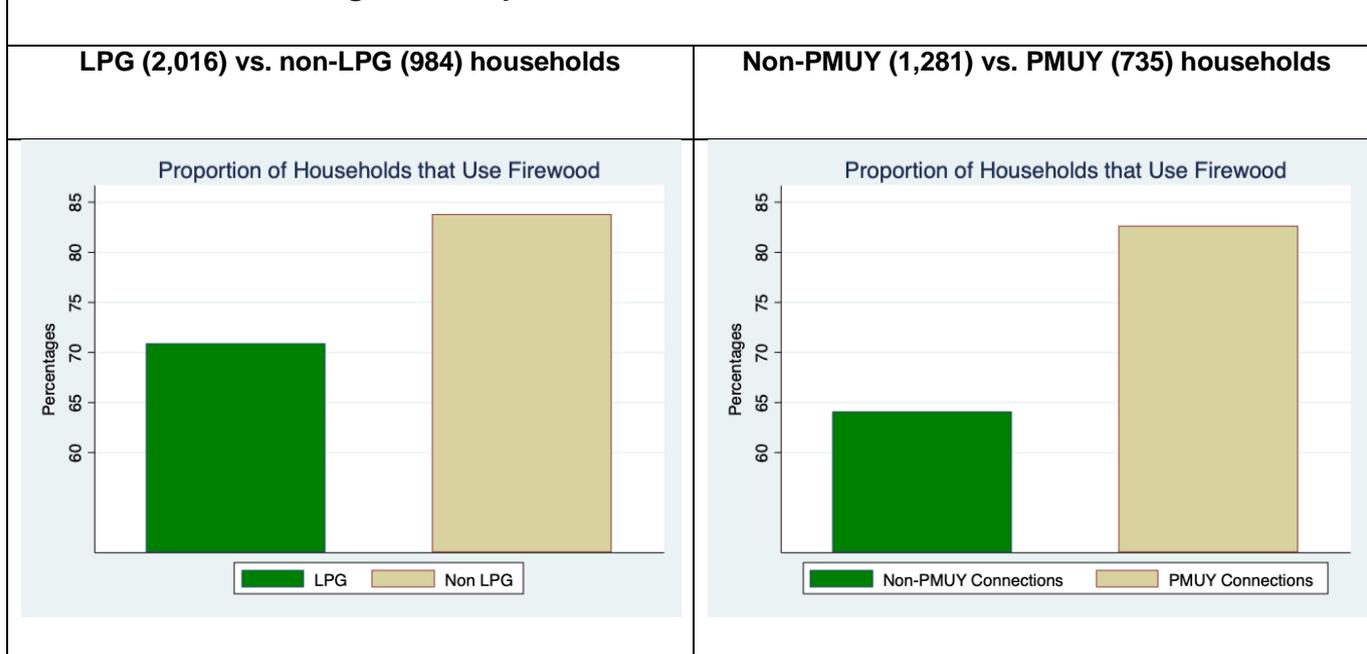
- Comparison of occupational profile across groups gives patterns that are similar to those obtained for education: *LPG households have relatively stable incomes vis-à-vis non-LPG households, while non-PMUY households have the highest stability in this regard.* On average, just over half of households with PMUY connections are likely to work as casual labourer. Non-PMUY connection holders have a higher proportion of household heads who are self-employed or in a salaried job.

Figure 3. Percentage of household heads that are self-employed or salaried

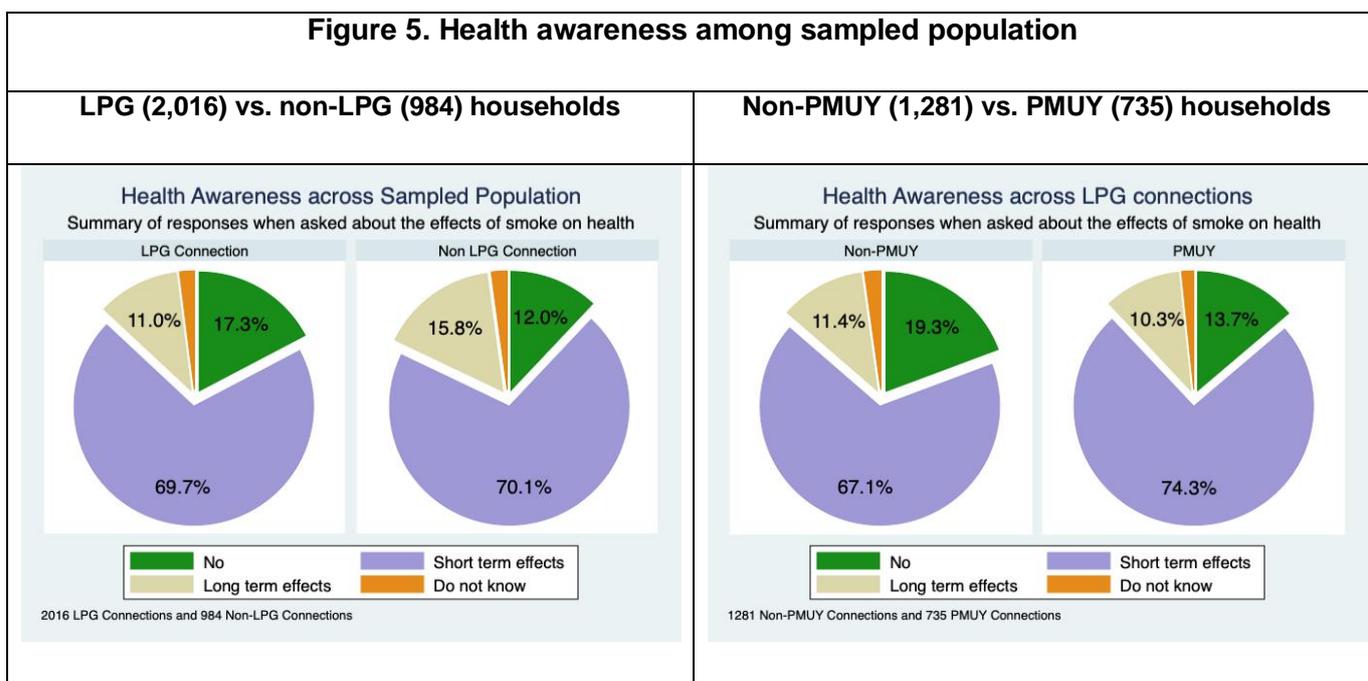


- *PMUY households and non-LPG users have similar patterns of firewood use. LPG users in general and non-PMUY households in particular, have a lower proportion using firewood. Besides, dung-cakes are commonly used in Indore area: 85% of LPG households and 93% of non-LPG households use this traditional cooking fuel.*

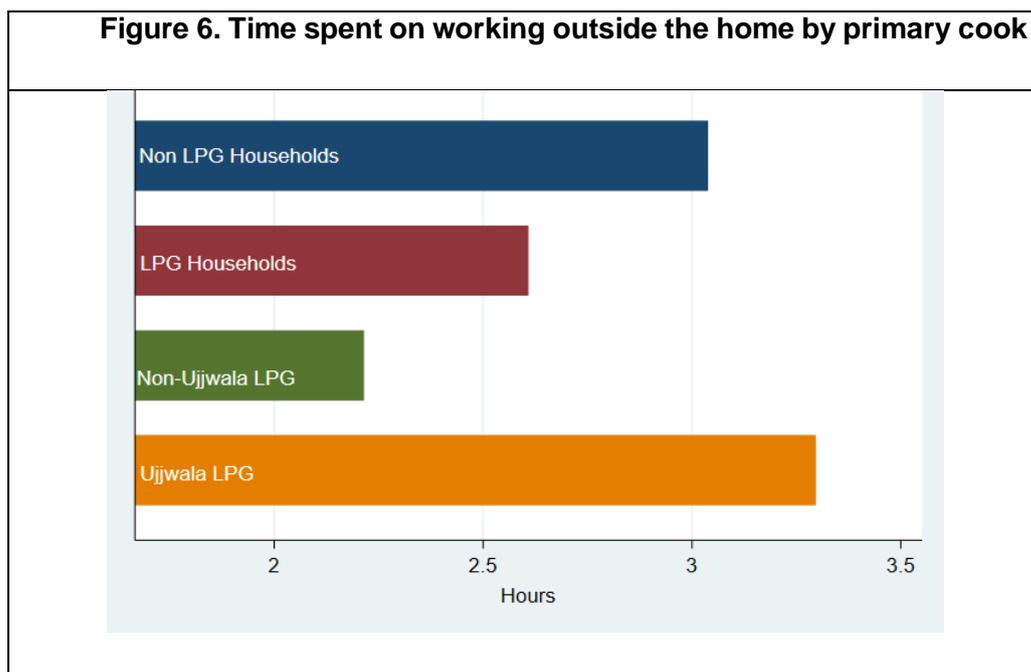
Figure 4. Proportion of households that use firewood



- Across all groups, the majority of households perceive the effects of chulha-smoke as having only short-term health impacts. Only about 10-15% households say that there can be long-term health impacts, while 12-19% says that there are no harmful effects of smoke from traditional fuels.

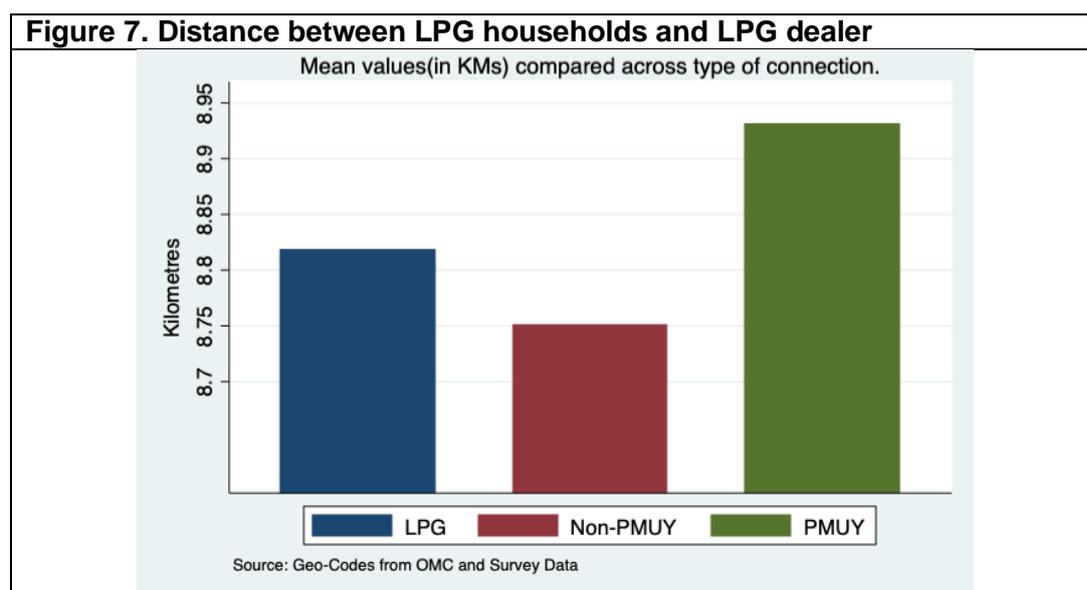


- *Primary cooks in PMUY households have to work more outside home for income.* Comparing across LPG households, primary cooks in PMUY households spend 1 hour more than those in non-PMUY households on work outside home for income, by reducing time spent on child care, personal care, and leisure. Thus, PMUY has the potential to reduce poor women’s time spent on cooking/fuel collection.



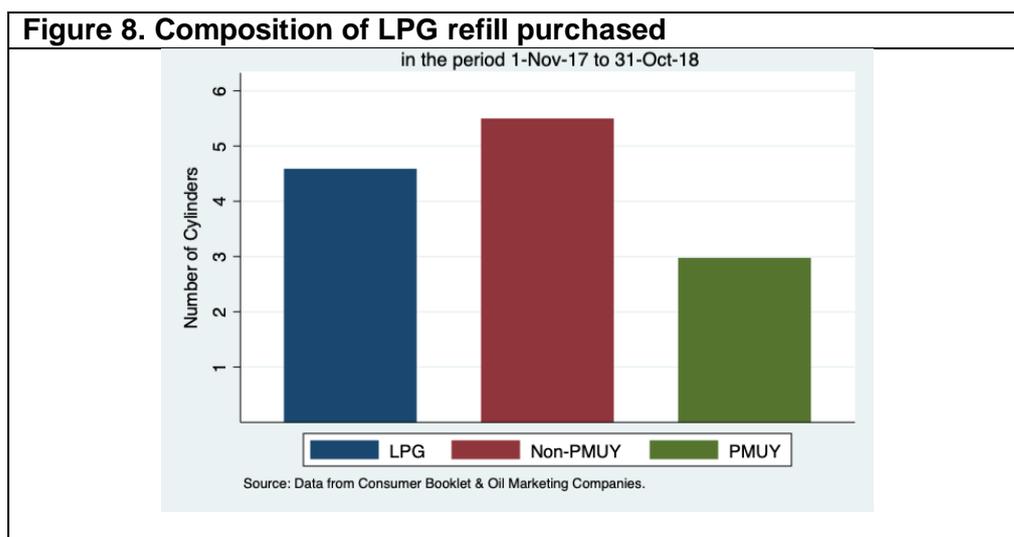
Supply-side factors: LPG connection details²

- There is a supply-side constraint in terms of average distances between households and corresponding LPG distributor. The average distance between households and distributors is 8.8 km. The pattern of distances varies across OMCs and by type of LPG connection.

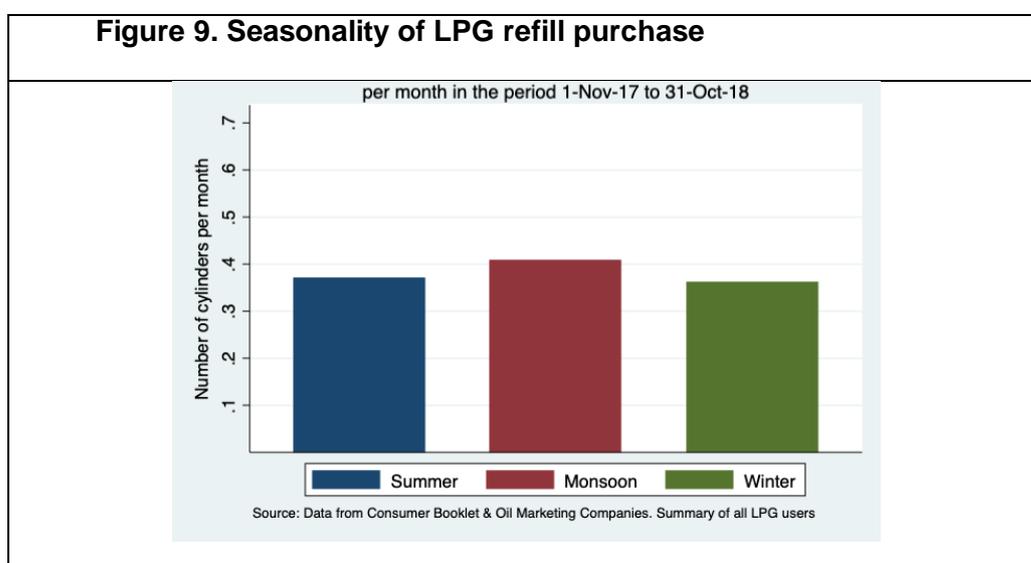


² These findings are based on 2,010 of the 2,016 LPG households (1,278 non-PMUY; 732 PMUY) for which refill data is available.

- *There is potential to enhance use of LPG among PMUY households with LPG connections.* Looking at the distribution patterns of the number of LPG refills across OMCs, there is potential to increase LPG usage by understanding the characteristics of customers of OMCs that have relatively lower refills, on average.



- *Purchase of LPG refills varies across seasons depending on availability of alternative cooking fuels, and in general, the trend is similar across PMUY and non-PMUY households.* All LPG households buy more refills per month during monsoon as compared to summer and winter. This is because of limited access to wood and high moisture content in dung cakes in the rainy season.



Policy recommendations

- *There is scope to increase the uptake of LPG by households as well as its use by LPG households. While a large number of LPG connections have been released under PMUY, it is seen that close to a third of the households in the study sample do not have an LPG connection. Further, refill purchases by households are limited indicating low usage of LPG for cooking. On average, PMUY customers in Indore buy around 4 refills in a year while non-PMUY customers buy around 7. This suggests that PMUY customers are not switching to LPG. The government information campaign is mainly focused on safe usage of LPG cylinders – for instance, building a platform in the kitchen such that the stove is placed above the cylinder – and on the subsidy provided to beneficiaries under the scheme. However, this is insufficient for increasing take-up and use of LPG.*
- *PMUY could be more effective if supplemented with carefully and optimally crafted information campaigns on the long-term health benefits of using cleaner fuels and on the financial incentive for Below-Poverty-Line (BPL) households: (i) Most households are not aware that solid fuel usage causes not only short-term discomfort, but also serious long-term effects on health, particularly of women and children. The lack of awareness is part of the reason why households do not switch to LPG for cooking. (ii) There is also a lack of awareness among beneficiaries regarding financial incentive under PMUY. Most beneficiaries do not know that the subsidy amount increases with the fuel price, so that their out-of-pocket expenditure on fuel remains the same.*

- *Subsidy for the rich should not increase with the price of fuel, and some of the saving could be used to increase financial support to BPL households.* Even if beneficiaries are aware of the financial incentive under PMUY, they may face a liquidity constraint in buying refills as upfront payments are required. Both BPL and non-BPL households receive the same subsidy amount on purchase of LPG. The government has launched the '#GiveltUp' campaign to motivate LPG users who can afford to pay the market price for LPG to voluntarily surrender their LPG subsidy; however, not many have done so.
- *It should be ensured that all customers register their phone number and that the message of the Direct Benefit Transfer (DBT) is sent in local language to the registered phone numbers.* PMUY customers without mobile phones or mobile numbers not registered with OMCs may be unaware of the financial benefits that they receive. Besides, the SMS is in English and hence, a lot of the PMUY customers may not understand it.
- *Efforts need to be made to raise awareness of the adverse health effects of traditional fuels for greater uptake of LPG.* Multiple fuels may be used by a household and there is seasonality in fuel choice. Households may use wood when it is cheap and switch to LPG during the monsoons, and may even use different fuels for cooking different items on the same day on account of taste-based preferences. If households are made aware of the adverse health effects of solid fuels, particularly the long-term effects, they are more likely to eliminate their use completely and switch to LPG.

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*University (sponsored by IFMR Society) to enable synergies between academia and the research centre.
For more information, visit www.iwwage.org.*

*Within the initiative, four projects are being led by Prof. Farzana Afridi at the Indian Statistical Institute.
This research has been conducted under one of the projects.*