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Reforming LPG Subsidy Program for India's Energy Transition

The PMUY Program

Household sources of ambient air pollution, such as cooking and heating, are the single largest contributors to poor air quality in much of the developing world, including India. Increasing the usage of clean fuels such as LPG in low-income households is, thus, central to India's transition towards clean energy.¹ Pradhan Mantri Ujjwala Yojana (PMUY), launched in 2016, is an ambitious social welfare scheme that has provided subsidized LPG connections to 103 million women from the poorest families. The program has the potential to improve the health and productivity of these households, while also empowering women as the subsidy is directly transferred to their bank accounts.

Before PMUY, 87 percent of rural households used biomass to cook (Chandramouli, 2012), since solid biomass fuels like wood, charcoal, or dung are cheap or freely available. Since 2016, following the launch of PMUY, the proportion of households with access to LPG

has increased significantly. However, most rural households continue to use solid fuels, either exclusively or alongside LPG. Specifically, regular usage of LPG continues to be very low in PMUY families (about 3 LPG refill cylinders per year), which is only about half of that of non-PMUY households. Informing households about the health benefits of shifting to LPG does not lead to significant increases in gas demand for rural, low-income households unless they also receive information on the availability of LPG subsidy benefits (Afridi, Debnath and Somanathan, 2021). This suggests that financial constraints are the key reason for the low regular usage of LPG by rural households.

The Government has marked PMUY as a flagship program but has also recognized that poor households are not using as much LPG as expected. In this policy brief, we outline some key challenges and propose potential reforms to increase the usage of LPG by poor

households in India.

Background on the LPG subsidy program

There have been three phases of policy reforms aimed at meeting the dual objectives of increasing access to clean cooking fuel and reducing the fiscal burden of LPG subsidies in India (Mittal, Mukherjee and Gelb, 2017):

Phase I: Cap consumption of subsidized LPG cylinders for household customers starting from 2012-13.

Phase II: Direct transfer of subsidy to consumers' bank accounts through PAHAL (Pratyaksh Hanstantrit Labh) for LPG consumers implemented during 2013-2015.

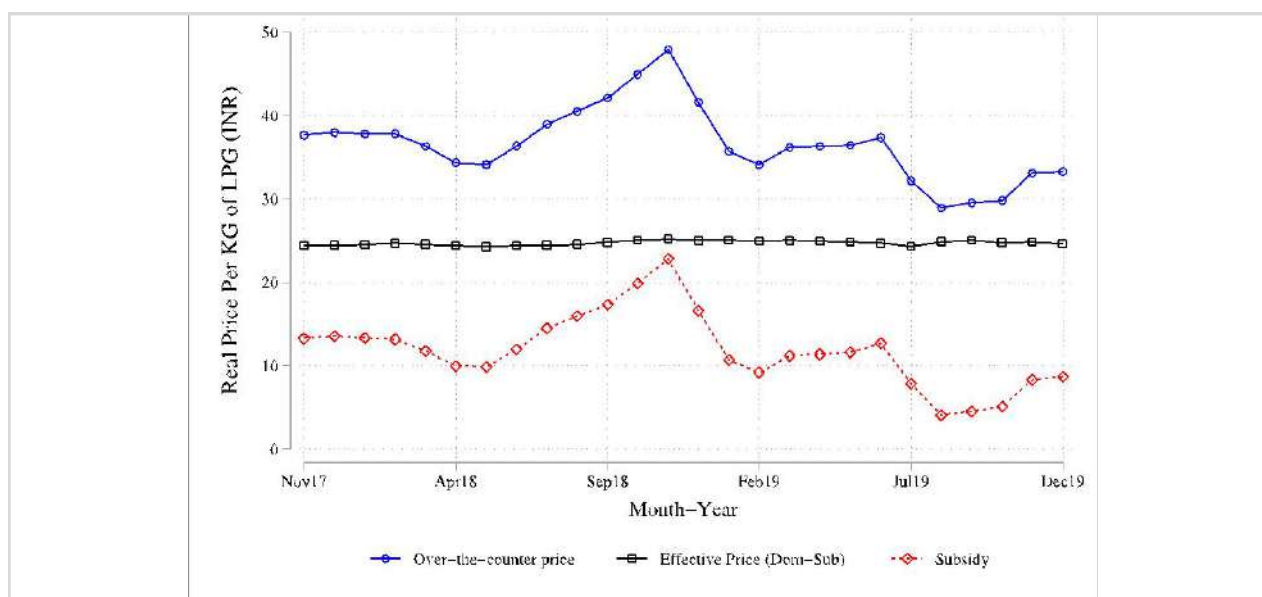
Phase III: Identify and target different consumer segments from 2015 onwards:

1. Excluding the richer households – no subsidy to High-Income Groups and the 'Give It Up' program.

2. Targeting the poor households through PMUY – targeted one-time LPG setup and regular LPG price subsidies.

As can be seen from the above, India's LPG subsidy policy has evolved rapidly since 2012. In Phase III, there have been policy changes to target the subsidy to poor households. While the PMUY program provides a one-time 'set-up subsidy' to meet the fixed cost of setting up an LPG account, stove, and refill connection, the subsidy on the LPG cylinder refills was universal (i.e. both PMUY and non-PMUY consumers were eligible) and was pegged to the market price until 2020. This implied that the out-of-pocket price for the LPG consumer was fixed (see Figure 1). For instance, if the government-regulated market price of a 14kg LPG cylinder was INR 820, the subsidy amount of INR 320 was directly deposited into the consumer's linked bank account within about 7 days of purchase, and that means the consumer faces an effective price (net of subsidy) of INR 500 per refill.

Figure 1: Over-the-counter Price, Effective Price and Subsidy on LPG (November 2017 - December 2019)



Notes: LPG prices obtained from the OMC administrative dataset. Over-the-counter price of LPG is the price paid by consumers upfront to purchase LPG. Effective price is over-the-counter price minus the cash-back subsidy floated in tandem with the over-the-counter price. The Y-axis shows all three prices in real (2012) INR for 1 kg of LPG. The X-axis shows the corresponding month, from November 2017 to December 2019 (26 months). All prices are averaged across the 3 OMCs.

For a brief period, the LPG subsidy was discontinued for all consumers between 2020 and 2021. It has been reintroduced since - as a fixed refill subsidy (not pegged to the market price of LPG) and only for PMUY households since May 2022. Under the current regime, PMUY households receive a one-time 'set-up subsidy' under the Ujjwala program to cover the fixed cost of their transition from traditional biomass stoves to LPG. These households purchase the cooking gas refill by paying the over-the-counter price at the point of purchase, which is regulated by the government based on the international market price of LPG. In other words, PMUY households pay the full market price as an over-the-counter price at the point of purchase, but subsequently (in about a week, on average) they receive a fixed cash-back subsidy into their bank accounts of about INR 300. Unlike pre-2020, since the market price of LPG refill varies monthly, the out-of-pocket price (i.e., the effective price net of subsidy) also varies each month.

Program design imposed constraints on low-income households

In either scenario (fixed or varying effective price for LPG refills), the requirement to pay the full market price upfront (at the point of purchase) makes it difficult for the PMUY consumers, who face a 'liquidity constraint', to buy LPG refills regularly. PAHAL or direct benefit transfer helped reduce leakage of subsidized gas cylinders to the black market

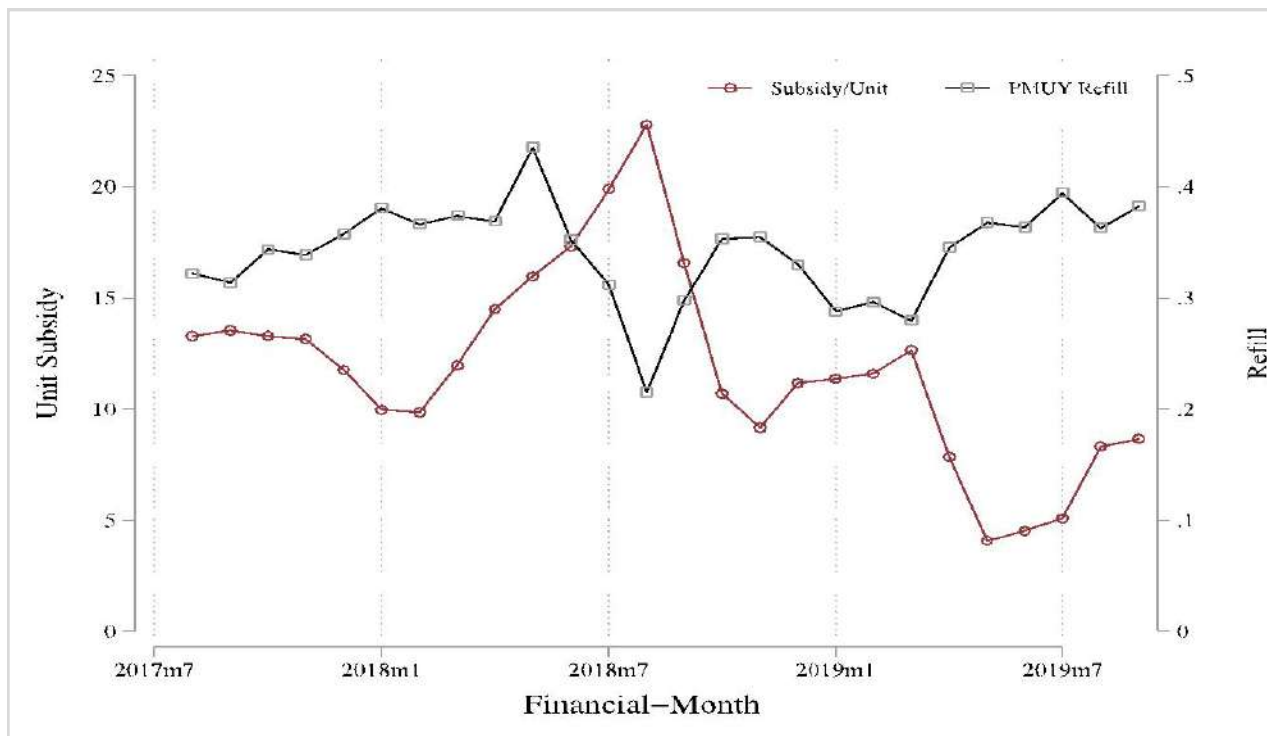
at a time when primarily middle-to higher income households were using LPG and diversion was rampant. However, when it comes to increasing LPG refill take-up of low-income, PMUY households, this current cash-back design of PAHAL may not be efficient. For low-income households, the need to pay the full market price upfront for LPG refills is

likely more significant than the duration of delay, whether it be two days or seven days.

Using LPG refill consumption data of all three Oil Marketing Companies (BPCL, HPCL, and IOCL) for two years (2018 and 2019 - when the LPG refill subsidy was universal and pegged to the market price, keeping the subsidized price constant - see Figure 1 above) for one entire district in Madhya Pradesh, we find that PMUY and non-PMUY consumers respond differently to the refill market prices.

An increase in LPG refill market price (i.e., unsubsidized market price) should not reduce refill purchase when the subsidy (pegged to the market price) is deposited in the customer's bank account later, such that their out-of-pocket price (i.e., the effective price net of the subsidy) is unchanged. However, this is not true for PMUY consumers. Hence, even when the bank-deposited refill subsidy increases in tandem with the market price (until early 2020), the refill purchases of PMUY consumers fall (see Figure 2).

Figure 2: LPG subsidy and PMUY refill purchase



Notes: Unit subsidy is subsidy amount in INR per kg LPG. PMUY refill is the average number of 14 kg LPG refills purchased by PMUY households in a given month.

Source: OMC refill consumption data. Authors' calculations.

Data indicates that low-income, PMUY households are sensitive to the amount and the timing of refill subsidy, even when the post-subsidy, out-of-pocket price of gas does not change (as was the case prior to 2020) (Afridi, Barnwal and Sarkar, 2024). An increase of INR100 in the per 14kg refill subsidy, decreases monthly 14 kg refill purchase by about 25 percent for PMUY consumers! The likely reason is the liquidity constraint when the government-regulated market price and consequently the subsidy both are high. This means that there is a large gap between what the household has to pay upfront and the net price after the delayed refill subsidy transfer.

The liquidity constraint low-income households face in availing subsidized LPG refills, of course, is not the only factor shaping their LPG usage. Households' limited ability to pay for LPG, coupled with missing credit

markets, informational frictions, and other norms and taste-based factors may also be responsible for low LPG purchases among low-income households. However, addressing these factors requires economy-and-society-wide developments that are often slow. In contrast, addressing the inefficiency arising from the current program design — as we have described above — is relatively more straightforward to tackle.

Evidence from the Pradhan Mantri Garib Kalyan Yojana (PMGKY), which was introduced during the COVID-19 pandemic, strengthens our claim of financial and liquidity constraints impacting poor households. Between 1st April 2020 and 31st Dec 2020, PMUY beneficiaries were credited with the amount (upfront subsidy covering the full market price) required for buying 3 LPG refills under this program. Using LPG refill consumption data

from OMC administrative records, we find a spike in PMUY average refill consumption in April 2020, while there was no change in non-PMUY consumption – almost wiping out the gap in refill consumption between PMUY and non-PMUY consumers.

Can the design of the existing LPG refill subsidy program be altered to provide LPG subsidies more effectively and yet be fiscally neutral?

It is not only imperative to provide a substantive, targeted refill subsidy study to PMUY households but also to consider alternative designs of LPG refill subsidy that reduce the immediate cost of purchasing the refill at the time of purchase.

Policy recommendations

We make the following recommendations:

First, the analysis of administrative data on LPG refill consumption provides a strong case for shifting the subsidy program to a just-in-time subsidy transfer. At the same time, the policy shift must ensure that there is no leakage of benefits. Hence, any policy reform to the existing program must include a rigorous evaluation and continuous monitoring of its effectiveness on both margins – the inclusion of low-income households and any potential subsidy leakages.

Thus, we do not need to go back to the pre-DBTL system – where subsidy leakages through distributors and others were rampant – to address this challenge. Rather, modern fin-tech-based solutions can be utilized to provide ‘just-in-time’ subsidies to PMUY consumers in a secure manner. We propose two fin-tech-based solutions for reducing the temporary financial burden on the purchase of LPG refills and ensuring that low-income

consumers do not have to pay the subsidy amount upfront out of their pockets.

a. Electronic payment of subsidy amount to the dealer/deliveryman at the point of refill purchase by PMUY consumer. A step to obtain the consent of the consumer for this subsidy transfer can be embedded using an automated text or voice message over the consumer’s registered phone number (which may be AADHAR-linked). Upon confirmation of the subsidy transfer, both, the delivery agent and the consumer should receive a message notifying them, so that the delivery agent can’t charge more than the subsidized price.

b. Digital rupee (e-RUPI): The recently launched purpose-specific digital currency by the RBI fits particularly well, where a merchant-specific digital voucher worth the subsidy amount can be provided to PMUY users beforehand via SMS or QR code. At the time of refill purchase, the consumer will provide the digital voucher to the dealer/deliveryman. Since the e-RUPI voucher can be restricted to a specific type of merchant (i.e., OMC distributors) it addresses concerns about the diversion of the subsidy by households. Alternatively, a RUPAY debit card (issued with Jan Dhan accounts) can be used for the advance transfer of the refill subsidy.

Finally, irrespective of the nature of the subsidy program, we advocate subsidy awareness drives in rural areas to explain the implications of the scheme on households’ budgets and fuel expenditures.

Conclusion

Considering the health and productivity impacts of clean fuels, particularly for women and children in low-income families, the benefits of removing the delay in subsidy transfer are likely to be huge, even without any increase in the fiscal burden of the

government. Specifically, using the NFHS data we estimate that an INR 2.5 per kg increase in over-the-counter price may reduce LPG usage by low-income households by about 10 percent, which in turn, leads to an increase in neonatal mortality of about 12.5 infants per 1000 births (Afridi, Barnwal and Sarkar, 2024).

Our evidence, thus, highlights the importance of the Ministry of Petroleum and Natural Gas and the Ministry of Finance combining digital technology with PAHAL and PMUY in the next stage of LPG subsidy policy reforms.

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Further reading

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¹ Liquified petroleum gas (LPG) has significantly lower carbon and particulate material emissions when compared to alternative biomass fuels like firewood, charcoal, dung cakes, and crop residues, currently used by about two billion households across the world. Cooking with biomass currently adds to about 2 percent of global carbon dioxide equivalent emissions (Bailis et al., 2015). Furthermore, India's current electricity grid is carbon intensive (approximately 80 percent coal) -- full electrification may be more CO₂-intensive than cooking with solid-fuels (Floess et al., 2023).

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