



How to Target LPG Subsidies in India:

Step 2. Evaluating policy
options in Jharkhand

GSi REPORT



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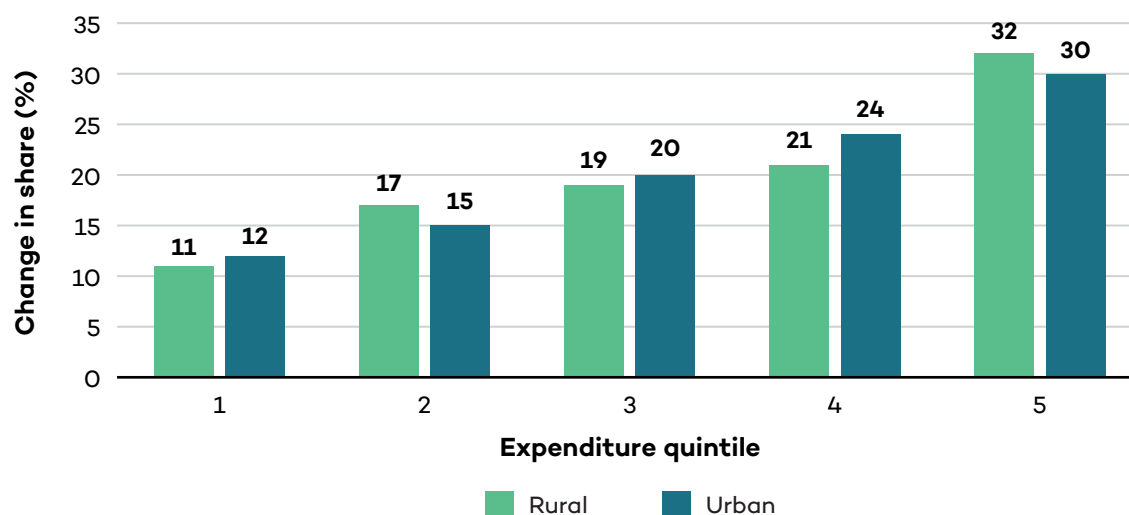
Executive Summary

Why Explore Liquefied Petroleum Gas Subsidy Targeting?

In fiscal year (FY) 2019, India's subsidies for liquefied petroleum gas (LPG), a cleaner cooking fuel, amounted to INR 54,518 crore (USD 7.74 billion). LPG subsidies are expensive and create fiscal pressure at a time when its revenues are falling because of COVID-19. Through connection support, consumption support, and lower taxation, they have played an important role in the massive uptake of LPG. The aim of this policy has been to shift households away from traditional biomass fuels that release dangerous amounts of indoor air pollution, causing respiratory disease, particularly among women and children.

In May 2020, the dramatic decline in world oil prices resulted in a large decrease in LPG cylinder prices, effectively removing any LPG subsidy per cylinder. Since then, both oil prices and LPG cylinder prices have climbed upwards again, with prices reaching pre-COVID levels. As of the time of writing, there has been no clarity on whether the LPG subsidy will be reintroduced, but it is anticipated that demand for their return can only grow. The COVID-19 crisis has severely affected incomes, further stressing the need to provide support for affordable clean cooking for the most vulnerable. This report discusses the potential for “subsidy targeting”: suggesting that any reintroduction of LPG subsidies should focus benefits on those most in need while reducing them for better-off consumers.

Figure ES1. Distribution of total subsidies (in %) by rural and urban expenditure quintiles



Note: The distribution of benefits above is illustrated across “quintiles” ordered by relative expenditure levels. Quintile 1 is made up of the poorest households and quintile 5, the wealthiest households. A similar regressive distribution is observed when quintiles are defined using a wealth index (a score for households based on non-electric assets and socio-economic status). See the full report for results broken down by different methods for identifying poorer and richer households.



Our Approach

This report seeks to promote a discussion on targeting using robust survey data from over 900 households in Jharkhand on LPG consumption, household expenditure, and assets. We assess: (1) the distribution of existing LPG subsidies and (2) the performance of different targeting strategies.

Distribution of Existing LPG Subsidies

LPG subsidies are regulated by the national government, with the subsidy varying with monthly revisions in LPG cylinder prices. We found that the distribution of LPG subsidies is regressive in Jharkhand, namely:

- Among rural households, the top two quintiles—the richest 40% of households—receive 53% of subsidy benefits, and the bottom two quintiles receive 28%.
- Among urban households, the top two quintiles receive 54% of subsidy benefits, and the bottom two quintiles receive 27%.

How Could LPG Subsidy Targeting Be Improved?

We evaluated two strategies to improve subsidy targeting, resulting in the following changes in subsidy distribution.

Table ES1. Summary of approaches to improve LPG subsidy targeting

Option	Description	Results
Volumetric targeting	This targeting option reduces the annual quota of a subsidized cylinder from 12 to 9 for each LPG consumer.	This did not impact the distribution of LPG subsidies, and it continued to be regressive: better-off households received a higher share of subsidy benefits, while poorer households received a smaller share. But this option reduced subsidy expenditure, as it reduced subsidy transfers by 14% in rural areas and by 19% in urban areas.
Differential subsidy for Pradhan Mantri Ujjwala Yojana (PMUY) consumers	This targeting option allocates a higher per-cylinder Pratyaksh Hanstantrit Labh Yojana (PAHAL) subsidy only for beneficiaries of PMUY, such that the first set of three cylinders consumed annually is at a 90% subsidized rate, the second set is at a 60% subsidized rate, and the third set is at a 30% subsidized rate, with consumers paying market rates after their ninth refill. Non-PMUY users receive a flat 30% subsidy on nine cylinders annually and market rates after their ninth refill.	This increased the average subsidy received by all groups but also made no significant change to subsidy incidence. In rural areas, the richest 40% now received 52% of benefits compared to 53% earlier. The poorest 40% saw subsidy benefits fall to 27% from 28% earlier. Similar results were observed among urban households. It should be noted, however, that these estimates assumed no change in consumption patterns as a result of higher subsidies.



Recommendations

This report has tested and analyzed several options but did not identify a “magic bullet” for easily improving LPG subsidy distribution among poor households. The main bottleneck in improving subsidy distribution appears to be the low consumption of subsidized LPG cylinders among poor households and the high consumption among better-off households. Subsidies therefore accumulate to better-off households with higher consumption of subsidized LPG cylinders. Until reasons for low consumption by poor households are better understood and addressed, and an effective way is found to restrict benefits for better-off consumers, policy-makers can consider applying volumetric targeting to continue to limit overall subsidy expenditure.

Since the COVID-19 crisis began, many households in India have seen a dramatic fall in incomes and are anticipated to fall back into poverty. Coupled with Jharkhand’s existing high levels of poverty, this strongly suggests that the choice of any new targeting mechanism when LPG subsidies are reintroduced must be undertaken with care to not increase the hardships for any poor households.

This report makes the following recommendations to improve subsidy targeting when the government reintroduces an LPG subsidy.

- **Map the knowledge gap:** This study demonstrates that LPG subsidies are highly regressive in Jharkhand. A dedicated effort is needed to identify the equity of LPG subsidies across India in order to better concentrate policy attention on this problem.
- **Test smarter indicators:** Poverty is contextual, and this report tested interventions for Jharkhand, a state with high poverty. Many of the approaches tested here may yield different results for other states. Further work could also be done to continue this study’s tentative exploration of indicators, like motorcycle ownership, that could be used to restrict subsidies to higher-income households. Other options include geographical targeting (based on a physical area with a higher percentage of vulnerable households) or social categorical targeting (where households qualify if they are beneficiaries of existing social welfare schemes). Leveraging both national and Jharkhand-level women-centric schemes could also be explored as a way to implement possible categorical targeting.



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Acronyms and Abbreviations

AAY	Anantodaya Anna Yojana
APL	Above Poverty Line
BPL	Below Poverty Line
DBT	Direct Benefit Transfer
DBTL	Direct Benefit Transfer for LPG
FY	fiscal year
LPG	liquefied petroleum gas
MoPNG	Ministry of Petroleum and Natural Gas
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
NREG	national rural employment guarantee
NSAP	National Social Assistance Programme
OMC	oil marketing company
PAHAL	Pratyaksh Hanstantrit Labh Yojana
PDS	Public Distribution System
PH	Priority Household
PIB	Press Information Bureau
PMUY	Pradhan Mantri Ujjwala Yojana
PMGKY	Pradhan Mantri Garib Kalyan Yojana
PMJDY	Pradhan Mantri Jan-Dhan Yojana
PM Kisan	Pradhan Mantri Kisan Samman Nidhi
PMMVY	Pradhan Mantri Matru Vandana Yojana
SHG	self-help group
SECC	Socio-Economic Caste Census



1.0 Why LPG Subsidies and Their Targeting Matter

Energy subsidies can play an important role in tackling the “affordability” barrier to energy access. The Indian Central Government subsidizes liquefied petroleum gas (LPG), in part, to help households transition away from traditional solid fuels, which are responsible for high levels of household air pollution that primarily affects women and young children.

These policies have been extremely successful in increasing LPG consumption. In recent years, however, their cost has grown considerably, which may make them hard to sustain. In fiscal year (FY) 2019, LPG subsidies added up to INR 54,518 crore (USD 7.74 billion), 28% of all national energy subsidies (Garg et al., 2020).¹ This is almost three times the value in FY 2017 (Garg et al., 2020). In 2020, the subsidies will have temporarily fallen to very low levels due to the world oil price crash amid the COVID-19 pandemic and the temporary halting of LPG subsidies since May 2020. But this is an exceptional change, and costs may climb again as the world economy and oil prices recover and if LPG subsidies are reintroduced.

Despite the fiscal burden, there is growing demand for LPG subsidies. According to a 2018 survey of rural households in India’s six most energy-deprived states, over 60% of respondents wanted higher LPG subsidies over other clean cooking interventions, up from 47% in 2015 (Jain et al., 2018). Similarly, 70% of households already using LPG as their primary fuel thought it was too expensive, compared to 57% in 2015 (Jain et al., 2018). In FY 2016, active LPG domestic consumers stood at 148.6 million. As of FY 2020, this had grown 87% to 278.7 million.

Subsidy “targeting” is one option that can maintain LPG subsidies for poor consumers while reducing overall program costs: that is, focusing subsidy benefits on a narrower subset of beneficiaries. But there are big knowledge gaps standing in the way of its effective implementation. There is no up-to-date publicly available national distribution data on the effectiveness and efficiency of India’s LPG subsidies.

This report aims to fill the gap for timely and comprehensive analyses on subsidy distribution and effectiveness to support any policy redesign when LPG subsidies are reintroduced. Based on a household survey conducted in 2019 in Jharkhand, we analyze the distribution of LPG subsidies among households of different wealth levels. We then analyze several options for improving subsidy targeting. These measures have been shortlisted from a larger set of targeting interventions identified in IISD’s previous work, including Sharma, Jain et al. (2019).

This report is the fourth in a series that examines how energy subsidies can be better targeted in India, including:

- [*How to Target Electricity and LPG Subsidies in India: Step 1. Identifying Policy Options*](#)

¹ Exchange rates in this report for respective financial years are taken from <https://data.oecd.org/conversion/exchange-rates.htm>



- [*How to Target Residential Electricity Subsidies in India: Step 2. Evaluating Policy Options in the State of Jharkhand*](#)
- [*Unpacking India's Electricity Subsidies: Reporting, Transparency, and Efficacy*](#)

The methodology used in this report to track the distribution of subsidy benefits is the same as the one that has been used in previous studies on electricity subsidies.



2.0 Background of LPG Subsidies in India

2.1 LPG Subsidy Policies in India

India provides subsidies for LPG consumption and connections through the Pratyaksh Hanstantrit Labh Yojana (PAHAL) and Pradhan Mantri Ujjwala Yojana (PMUY) schemes, respectively. Its objective is to help households transition away from traditional solid cooking fuels, which are responsible for high levels of indoor air pollution that primarily affects women and young children.

The PAHAL scheme (also known as the Direct Benefit Transfer for LPG [DBTL]) was introduced in 2014. It aims to reduce illegal connections and diversion of subsidized LPG cylinders by requiring consumers to buy LPG at the market price, only afterwards transferring subsidies directly into people's bank accounts (Ministry of Petroleum and Natural Gas [MoPNG], 2020e). Subsidized LPG is sold as 14.2-kg or 5-kg cylinders through distributors for three national oil marketing companies (OMCs). To purchase subsidized LPG, households must enrol themselves in the registry belonging to the OMC that services their area using a form of personal identification (initially, Aadhar cards) registered to a household member and meet the eligibility criteria of an annual household income of less than INR 10 lakh (USD 13,494).

When it was first introduced, PAHAL seemed to succeed in reducing illegal connections and diversion because the number of beneficiaries fell. Upon closer examination, however, its impacts were more ambiguous, as many poor households were simply unable to register due to the Aadhar mechanism and other barriers to registration (Jain et al., 2016).

The PMUY scheme was launched under the MoPNG in 2016. Its initial goal was to provide 5 crore (50 million) LPG connections to poor households at a subsidy of INR 1,600 (USD 21.59) per connection over three years (MoPNG, 2016). Under the policy, a "connection" referred to all the up-front costs of starting to use LPG: a first LPG cylinder (which could subsequently be swapped for refills under PAHAL), an LPG stove, and associated equipment. The policy covered around half of the costs. Households could either pay the other half themselves or take a loan, which would be serviced by foregoing PAHAL subsidies until it was repaid.

A distinguishing feature of PMUY was its integration of gender considerations: it issued LPG connections only in the names of women from poor households (MoPNG, 2020f). In 2018, the government achieved its target for new connections and revised the 2019 target upward to 80 million LPG connections (Sharma, Singh et al., 2019). By September 2019, it reported having achieved this target (MoPNG, 2020f). In February 2021, the government announced it was extending PMUY to another 1 crore (10 million) consumers (Ministry of Finance, 2021).

Despite the success of PMUY in helping households use LPG for the first time, the number of households citing high costs and high monthly expenses as barriers to LPG use remained high, at 92% in 2018 (Jain et al., 2018). Media reporting suggested that, in particular, households



were struggling to afford the cost of LPG consumption because the INR 1,600 in assistance under PMUY had to be paid back by foregoing partial PAHAL subsidies in instalments on LPG refills (Sanghera, 2019; Sharma et al., 2019b; Yadavar, 2019). Data on fuel consumption showed that many households had begun to use LPG but had not transitioned away from traditional solid fuels, so indoor air pollution was still a persistent problem (Jain et al., 2018).

As oil prices hit a new low in May 2020, the price of the subsidized and non-subsidized 14.2-kg LPG cylinders reached a parallel at INR 594 (USD 8.01), temporarily zeroing out the subsidies (IANS, 2020). This was only a temporary reduction. As the world economy and oil prices recovered from December 2020, they were reflected in higher LPG cylinder prices. By February 2021, unsubsidized LPG cylinders hit a high of INR 794 (USD 10.71) per cylinder (Indian Oil Corporation Ltd, n.d) and LPG subsidies had not yet been reintroduced, with no policy announcements on clarifying the government's position.

In addition to these schemes, there also exists a concessional 5% Goods and Service Tax (GST) rate to keep LPG refill prices low (Garg et al., 2020).

Table 1 provides a summary of the expenditures associated with different LPG subsidies from FY 2014 to FY 2019.

Both consumption (PAHAL) and connection (PMUY) subsidies use some form of targeting. PAHAL uses income-based targeting to restrict subsidies to households earning less than INR 10 lakh annually; PMUY targets women from poor households listed in the Socio-Economic Caste Census (SECC) or state poverty lists. Other forms of targeting in LPG subsidies also exist, like the opt-out scheme called the Give It Up campaign, a quota-based approach that limits the consumption of subsidized cylinders to 12. The net impact of these approaches has been limited. See Sharma, Jain et al. (2019) for a detailed discussion on these approaches.

Table 1. India's LPG subsidies (INR million)

Subsidy	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
PAHAL (DBTL)	3,869	3,971	21,811	12,905	20,880	31,447
PMUY	NIP	NIP	NIP	2,999	2,496	5,649
Lower Goods and Service Tax rates for Domestic LPG	NIP	NIP	NIP	NIP	13,965	17,422
Excise Duty Exemption on Domestic LPG	4,056	3,703	5,046	5,844	NIP	NIP
Fiscal Subsidy on LPG	1,904	2,272	NIP	NIP	NIP	NIP
Permanent Cash Advance for DBTL	1,234	NA	5,755	NA	NA	NA



Subsidy	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
OMC support for LPG connections for poor households	39	225	791	NA	NA	NA
Under-recovery on domestic LPG	46,458	36,580	18	NIP	NIP	NIP
Total (INR million)	57,560	46,750	33,421	21,748	37,341	54,518
Total (USD billion)	9.4	7.3	5.0	3.3	5.5	7.7

Notes: NA = not available, NIP = not in place, NC = not calculated

* Includes Project Management Expenditure pertaining to DBTL Freight Subsidy on domestic LPG. Further subsidies identified but not calculated were Sales Tax Differential on LPG under Declared Good Status and Customs Duty Exemption on Imported LPG use for Domestic Use.

Source: Soman et al., 2018, including exchange rates.

2.2 COVID-19's Impact on LPG Subsidies

In March 2020, the Indian government announced the Pradhan Mantri Garib Kalyan Yojana (PMGKY) in response to the COVID-19 pandemic, valued at INR 1.7 trillion (USD 22.94 billion). It leveraged pre-existing public distribution system (PDS) and direct benefit transfer (DBT) platforms for food and cash disbursements under social welfare schemes that had already been in place before the pandemic. These schemes include the Pradhan Mantri Jan-Dhan Yojana (PMJDY), the Pradhan Mantri Kisan Samman Nidhi (PM Kisan), the Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA), PMUY, and the National Social Assistance Programme (NSAP).

Under the PMGKY relief measure for PMUY, the government announced three free LPG refills for 83 million PMUY households from April and June 2020 (Press Information Bureau [PIB], 2020a). As of July 2020, the government had spent INR 97.09 billion (USD 1.31 billion) to distribute 119.7 million cylinders to PMUY beneficiaries (PIB, 2020b), and the scheme was extended by three more months to the end of September 2020 to allow households more time to consume the three cylinders. In August, however, it was reported that, due to technical issues, between 3.1 million and 7.6 million women had not received their subsidy transfers (Sharma, 2020). As of September 16, 2020, the number of free cylinders deployed had increased to 135.7 million (PIB, 2020d).

The State of Jharkhand, which had an average refill rate of 2.57 cylinders per annum as of 2018, was already benefiting from a free LPG refill scheme under PMUY (Comptroller and Auditor General of India, 2019; The Hindu, 2019). However, it is uncertain whether these



cylinders continued to be received over and above the pandemic response measures or were absorbed by them.

2.3 Gender and Welfare Schemes in Jharkhand

The introduction of PMUY reflects the government's ambition to increasingly include gender-disaggregated conditionalities in the realm of subsidy targeting: the scheme not only acknowledges the unequitable negative impacts of traditional cooking fuels on women from poor households, but it also allots LPG subsidies in the names of these women. Going forward, one option to improve targeting in Jharkhand is to align measures with other social welfare schemes centred around gender.

Jharkhand has a number of schemes centred on the well-being and empowerment of women. The national scheme Pradhan Mantri Matru Vandana Yojana (PMMVY) covering Jharkhand provides cash incentives between INR 5,000 (USD 67.47) and INR 6,000 (USD 80.96) (when coupled with the Janani Suraksha Yojana) to pregnant and lactating women (Ministry of Women and Child Development [MoWCD], 2017). The scheme has the potential to buttress categorical targeting efforts for PMUY with its women-centred database. It is also interesting to note that in September 2019, a Jharkhand survey found that of 202 women who applied for PMMVY, 155 had not yet received the cash entitlements (Angad, 2019). The study attributed this to long application forms before the release of each instalment and the numerous criteria to fulfill—requirements that are pervasive across the social welfare scheme landscape. For instance, the cash incentives were conditional on early registration of pregnancy, ante-natal check, and immunizing the child.

In addition, women-centred databases from government initiatives unique to Jharkhand can be leveraged to mutually strengthen both the LPG categorical targeting measures and the initiatives' databases. This includes the short-lived INR 1 (USD 0.01) stamp duty scheme on property registrations and the strongly supported (Harish & Smith, 2019) women-led self-help groups (SHGs). The former provides a robust example of the need to strengthen databases. According to media reports, the scheme was rolled back because beneficiaries accrued the advantage more than once, causing the government a loss of INR 10.7 million (USD 144,389) (Ranjan, 2020).

A women-centric focus in other existing social welfare schemes has arisen during the current pandemic through the PMGKY. In particular, the PMGKY relief measure for PMJDY aims to provide poor households access to banking, credit, and insurance facilities, with at least one basic banking account for every household. The PMJDY, an otherwise gender-blind scheme, shifted its focus to targeting women under the COVID-19 social response measure. In April 2020, 204 million women account holders were given INR 500 (USD 6.74) per month for a period of three months (PIB, 2020c). Further, the limit to collateral-free lending was increased from INR 10 lakh to INR 20 lakh (USD 13,494 to USD 26,988) for women organized in the 6.3 million entrepreneurial SHGs (PIB, 2020c). Although these measures have not been without obstacles, they have performed fairly well. As of August, 404 million PMJDY accounts and 663,000 SHGs are in existence, with Jharkhand accounting for 100% coverage of PMJDY at 14.4 million beneficiaries (Ministry of Finance, 2020) and 229,000 SHGs comprising over 2.5 million members (Ministry of Rural Development, 2020).



3.0 Methodology

In order to better understand the efficiency of existing LPG subsidies in Jharkhand and options to improve targeting, this study conducted a large-scale household survey so that up-to-date and robust data could compare LPG consumption with household well-being.

3.1 Survey Design

The survey was designed to be representative of the state-level population. Our sampling strategy split Jharkhand districts into two groups—east and west—of almost equal size. This stratification ensures geographical representation. In each group, we randomly selected six districts, with probabilities based on their relative population size. We then divided all rural villages in the 12 selected districts into two groups of equal size: one contained the largest villages and the other the smallest. We then did the same for urban wards. We selected two villages and two wards from each group, with probabilities weighted by the relative size of their population. In each village and ward, we randomly selected 10 households by choosing a public place like a large public school or a government office and then using a counting method to arrive at 10 households. In this way, we selected 10 households from eight units (two small villages, two large villages, two small wards, and two large wards)² from each of the 12 districts (six in the west, six in the east of the state) for a total of 960 respondents. To ensure that our results are accurate at the population level, we used probability weights to account for our stratified sample. Our weights account for the likelihood that a district is selected and, within this district, that a household is interviewed. We generate both a set of overall weights and a set of separate weights for urban and rural households. We use the latter when we split the sample.

Morsel Research and Development India, a Lucknow-based research company, conducted in-person household surveys in Hindi from September to October 2019. Interviews were conducted with the heads of households. Men were household heads in 82.5% of the sample: 86.8% of rural households and 78.5% of urban households.

² The survey used the categorization of rural and urban as defined in the 2011 census, where “urban” is identified as areas that are administered by either a municipality, corporation, or a cantonment and areas with a high population density of at least 400 persons per square kilometre, minimum population of 5,000, and where agriculture is not the dominant profession. Rural areas are those not identified as urban (Census of India, 2011). Distribution companies use a simpler definition, where rural areas are those administered by a *gram panchayat* and urban areas by municipalities, corporations, cantonments, and other urban development authorities. Our survey uses the rural/urban categories listed in the Census, which is only updated once every decade. This may lead to some differences, as some rural areas in our survey may now be categorized as urban by the distribution company.



Figure 1. Survey design

Jharkhand Survey Design



3.2 Approach for Estimating LPG Subsidy Benefits

The survey asked households³ to share all of the information that is required to estimate LPG subsidy benefits at the household level: whether or not a household member was in possession of a subsidized LPG connection, the type of connection (PMUY or PAHAL⁴), and the size and number of cylinder refills used in a year. LPG consumption is a particularly important metric and one where there is a significant risk that households may not report data accurately because of poor recollection of the number of cylinders consumed. LPG subsidy per household was calculated by multiplying annual LPG cylinder consumption with the average subsidy from May 2019 to March 2020 (for details, see Annex A).

In the sample, 72% of households had LPG connections: 46% had a PMUY connection, and 26% had a DBTL connection (see Table 2). The average number of 14.2-kg cylinders consumed annually by the entire sample was 3.6; PMUY households consumed 5.6, and DBTL households consumed 9.3.

Table 2. Households with LPG connections in the survey

	Number of households	Percentage of total sample
Households with DBTL connection	258	26%
Households with PMUY connection	459	46%
Households without LPG connection	277	28%
Total	994	100%

Source: Survey data

³ This research has focused on the household level to estimate LPG consumption and associated subsidy received. It has not examined per capita LPG consumption and per capita subsidy. Household LPG consumption is linked to the number of household members, which will vary with states. When this research is adapted for other states, a per capita approach can be considered to examine inter-state comparisons.

⁴ We found a difference of INR 21 per month between PMUY and non-PMUY subsidies from August 2019 to March 2020 (see Table A1).



3.3 Approaches for Categorizing Households

In order to examine the distribution of subsidies to poorer and richer households, it was necessary to categorize households according to their relative levels of wealth. There is no one accepted way to define richer or poorer households, and the definitions that are adopted can have a significant influence on the analysis. For this reason, the study chose to compare relative wealth levels through three different approaches: (1) a “ration card approach,” where a binary status of “poor” or “not poor” is designated based on possession of an official government ration card; (2) an “expenditure” approach, where quintiles are established based on self-reported household expenditure; and (3) a “wealth index” approach, where quintiles are established based on a multi-criteria wealth score, including reported income, reported expenditure, and ownership of assets.

3.3.1 Ration Card Approach

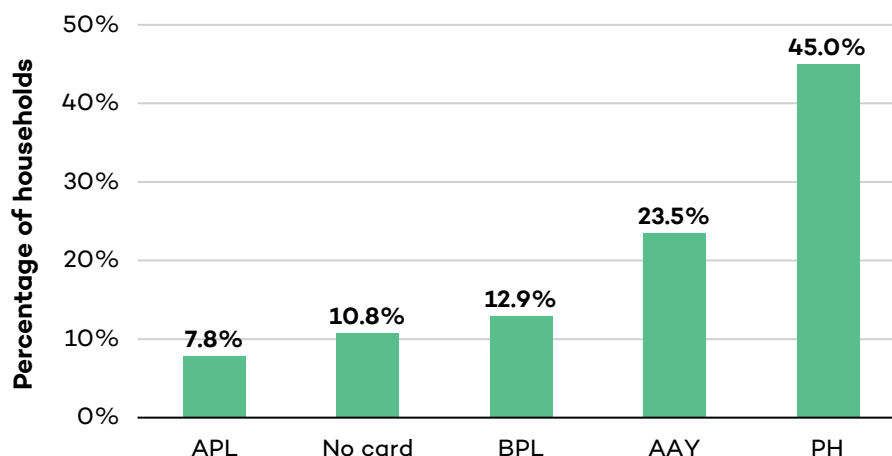
The first approach divides the sample into poor and non-poor households, defined according to the type of official ration cards they possess. Households with Below Poverty Line (BPL) cards, Priority Household (PH) cards, and Antyodaya Anna Yojana (AAY)⁵ cards were all included as poor for this analysis, as these households receive subsidized food and fuel. All the remaining households, namely those that possess an Above Poverty Line (APL) card and those who don’t possess any cards (also called “no card”), were designated as non-poor. By this method, 81% of surveyed households were identified as poor (see Figure 2).

Not all “no-card” households are necessarily non-poor. Some deserving households may not hold a card because of barriers to registration or because they cannot comply with residency laws. This is evident from our comparison of different approaches to identifying poverty status in Section 3.4, which demonstrates that some households with no ration cards are present in even the lowest groups of reported monthly household expenditures (see Figure 3). The same analysis shows that many households that report the highest levels of expenditures are also in possession of a poverty card. This highlights the extent to which the poverty card approach is only as robust as the methods used to target and distribute such cards. In the past, studies (e.g., Ram et al., 2009) have argued that there are errors in the government’s poverty identification methodology, and this prevents better targeting of the poor.

⁵ India’s targeted PDS has different types of ration cards that entitle beneficiaries to different quantities of subsidized food grains and fuel. Since the implementation of the National Food Security Act (NFSA) in 2014, BPL ration cards have been re-branded as Priority Households (PH) (Puri, 2017, p. 19) and in 2019 both were entitled to 3 kg of subsidized rice per month in urban areas and 5 kg of subsidized rice per month in rural areas of Jharkhand (Government of Jharkhand, n.d.b). This entitlement for AAY ration cards, seen as the poorest of the poor, is 21 kg per month in urban areas and 35 kg per month in rural areas of Jharkhand (Government of Jharkhand, n.d.b). APL ration card holders are not entitled to subsidized food or fuel.



Figure 2. Surveyed households disaggregated by type of ration card



Source: Survey data

3.3.2 Expenditure Approach

The second and third approaches both organized surveyed households into five categories called quintiles (representing 20% of the sample), from the poorest households (quintile 1) to the richest households (quintile 5), based on their self-reported monthly household expenditure or their estimated wealth index. While the quintiles were designed to be of equal size (in terms of households), many respondents reported the same level of monthly household expenditure. As a result, we could not make groups of exactly equal size based on expenditure. To ensure that our main results are accurate, we use averages within quintiles to account for the number of households in each quintile. This issue does not affect wealth quintiles, where each group is of equal size.

Self-reported monthly household expenditure—henceforth only called “expenditure”—is a common proxy for relative wealth levels in poverty analysis. It tends to be smoother over time than income and therefore reflects welfare more reliably.

The average reported monthly household expenditure for surveyed households in rural areas was INR 5,819 (USD 83), and in urban areas, it was INR 7,000 (USD 99) (a breakdown of expenditure ranges for different quintiles from surveyed households is presented in Table 3). Accounting for inflation, the official projected average monthly rural expenditure in 2019 would have been INR 7,284,⁶ and corresponding data for urban would be INR 14,180

⁶ This is calculated based on the official FY 2012 household expenditure, which was INR 4,784 in rural areas and INR 9,659.4 in urban areas, using a rural Consumer Price Index (CPI) of 92.8 for FY 2012 and 141.3 in FY 2019; urban CPI of 93.8 in FY 2012 and 137.7 in FY 2019 (Reserve Bank of India, 2019). These values were used in the following formula to arrive at the

$$FY\ 2019\ household\ expenditure = \frac{Household\ Expenditure\ in\ FY2012 \times CPI\ in\ FY2019}{CPI\ in\ FY2012}$$



(USD 207).⁷ Both official rural and urban monthly household expenditures are substantially higher than what is reported by surveyed households, suggesting either respondents under-reported their expenditure or a bias in the sample toward lower-income households. For FY 2012, Jharkhand's poverty line was marked at a monthly household consumption expenditure of INR 3,890 (USD 83) in rural and INR 4,967 (USD 106) in urban areas⁸ with 37% of the population BPL (Department of Finance Jharkhand, 2014, p. 13). These expenditure figures for poverty are the last known estimates. Measurement of poverty is now based on a deprivation index; according to that index, in FY 2016, 46.5% of Jharkhand's population was poor (Centre for Fiscal Studies, 2020, p. 15). Based on this poverty rate and expenditure data, the lowest two quintiles capture the majority of the population that is defined as poor by state definitions.

Table 3. Range of household monthly expenditure ranges, by quintiles (INR)

	Rural	Urban
Quintile 1	1,000–3,000	1,000–3,200
Quintile 2	3001–4,500	3,201–4,500
Quintile 3	4,501–5,000	4,501–5,500
Quintile 4	5,001–8,000	5,501–8,000
Quintile 5	8001 and above	8,001 and above

Source: Survey data

3.3.3 Wealth Index Approach

The wealth index attempts to take a broader review of what makes households worse or better off, accounting for factors such as non-electric assets and households' socio-economic status.

The wealth index was established by drawing on the variables used to identify poverty by India's national SECC (2011), supplemented by some additional variables chosen by the authors. The list of variables includes the education of the household head, the level of debt, various transportation items (bikes, cars, etc.), cattle ownership, non-electric assets, availability of drinking water, indoor toilets, whether the home is owned, how much land the household owns, whether the household buys subsidized grain, and whether the respondent worked under the national rural employment guarantee (NREG) scheme. Only poor households are assumed to access subsidized and food grains, as well as wages available as unskilled labour

⁷ Government data from FY 2012 on average monthly per capita consumer expenditure in Jharkhand is INR 920 in rural areas and INR 1,894 in urban areas (Government of Jharkhand, n.d.a). Based on average household size in FY 2012 of 5.2 in rural and 5.1 in urban Jharkhand (Census of India, 2012), the corresponding monthly household expenditure for FY 2012 is INR 4,784 in rural and INR 9,659.4 in urban Jharkhand. The average household size for surveyed households is 5.6 people.

⁸ Based on the poverty line's per capita consumer expenditure of INR 748 in rural and INR 974 in urban areas (Department of Finance Jharkhand, 2014).



under the NREG, making these two variables a strong identifier of poor households and hence included in addition to the SECC variables.

We combine these variables using factor analysis. The output of factor analysis is a variable that has a mean of zero and a standard deviation of one. A larger score means that the household is wealthier compared to the other households in the dataset. Households were then divided into five categories based on their wealth index. These quintiles are all of equal size (i.e., they contain the same number of households). Poverty levels are high in Jharkhand, and therefore households in the wealthiest quintile may not necessarily be “rich,” but these households should be seen as more well-off than those in the bottom quintiles.

Separate wealth indexes were established for urban and rural households, reflecting the different ways in which wealth materializes in the belongings of urban and rural areas. For this reason, under this metric, the wealth index of a rural household cannot easily be compared to the score of an urban household. The cost of splitting the data is to increase uncertainty around our estimates, but, as we show below, we still obtain reasonably precise results. Expenditure ranges for different rural and urban quintiles in this study are captured in Table 4. For more details on the construction of this wealth index, see Annex B.

Table 4. Inter-quintile ranges: Household monthly expenditure ranges for the wealth index in different rural and urban quintiles (INR)

	Rural	Urban
Quintile 1	3,000–5,500	3,000–6,500
Quintile 2	3,750–7,000	3,500–6,000
Quintile 3	4,000–7,500	4,000–8,000
Quintile 4	4,000–10,000	4,000–7,500
Quintile 5	5,000–10,000	5,000–10,000

Note: The INR figures in the table depict typical expenditure levels for each wealth quintile. These ranges represent the expenditure level at the 25th and 75th percentiles (i.e., the inter-quartile range). Inter-quartile ranges represent the range in which 50% of the respondents are located and therefore remove outliers. These ranges can be overlapping across wealth quintiles.

Source: Survey data

3.4 Comparing the Approaches

Figure 3 shows the distribution of ration cards by quintiles defined by expenditure; Figures 4 and 5 show the distribution of ration cards by rural and urban quintiles defined by the wealth index. For all types of measurements, there is a greater number of households with no card or an APL card in the wealthier quintiles. But households with some kind of poverty ration card still make up the majority of even the wealthiest quintile. If ration cards are poorly correlated with poverty and therefore visible in high numbers in wealthier quintiles, this could be a compelling reason to consider alternative approaches to assessing subsidy targeting in India.

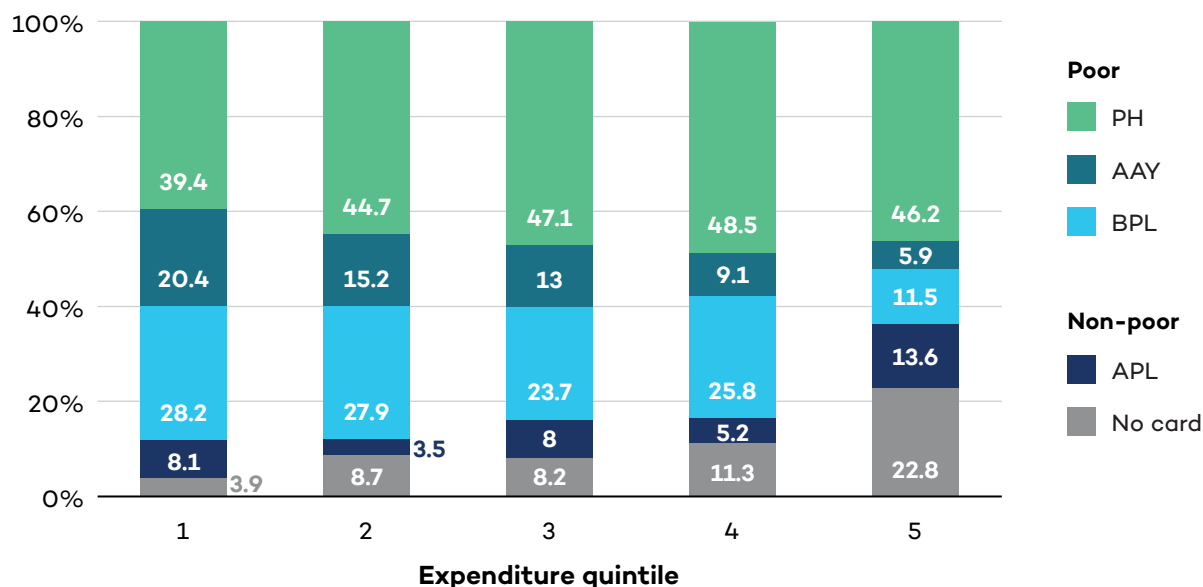


Box 1. Chi-square testing and statistical significance

This report uses Chi-square tests to examine the plausibility that two (or more) variables are distributed in the same manner in the sample and in the whole population. For example, when we divide the population into rural and urban segments, we may ask: is the proportion of poor, middle-class, and rich households the same in urban and rural populations? In such a situation, the Chi-square test allows us to verify whether the distribution of respective categories (poor, middle class, rich) in our sample are different in both rural and urban settings and if this pattern is likely to be true if we had sampled the whole population.

In a Chi-square test, the starting hypothesis (typically called the “null hypothesis”) is that the variables are independent and distributed in the same manner. We then evaluate whether the patterns across variables are different enough to decide whether we should reject this (“null”) hypothesis. If the data aren’t conclusive enough, we say that we “fail” to reject the null hypothesis, and that the data are consistent with the variables being distributed the same way across groups (sometimes also referred to as a statistically “insignificant” result). Otherwise, we may reject the null hypothesis and conclude that the variables are not independent (what is often referred to as statistically significant).

Figure 3. Ration card ownership by expenditure quintiles

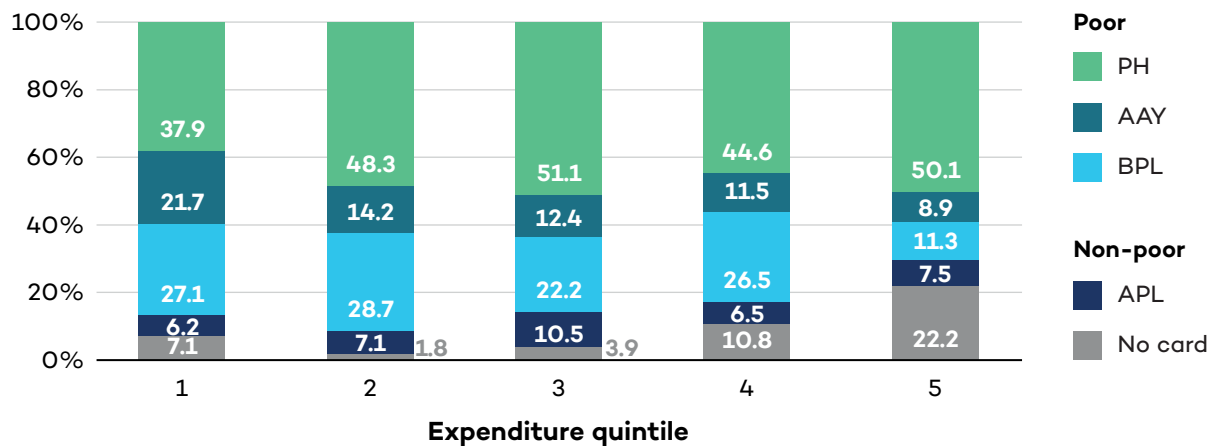


Note: A Chi-square test rejected the hypothesis that the distribution of households was the same across each quintile. Also, see Table 2 for expenditure ranges (in INR) for different quintiles.

Source: Survey data



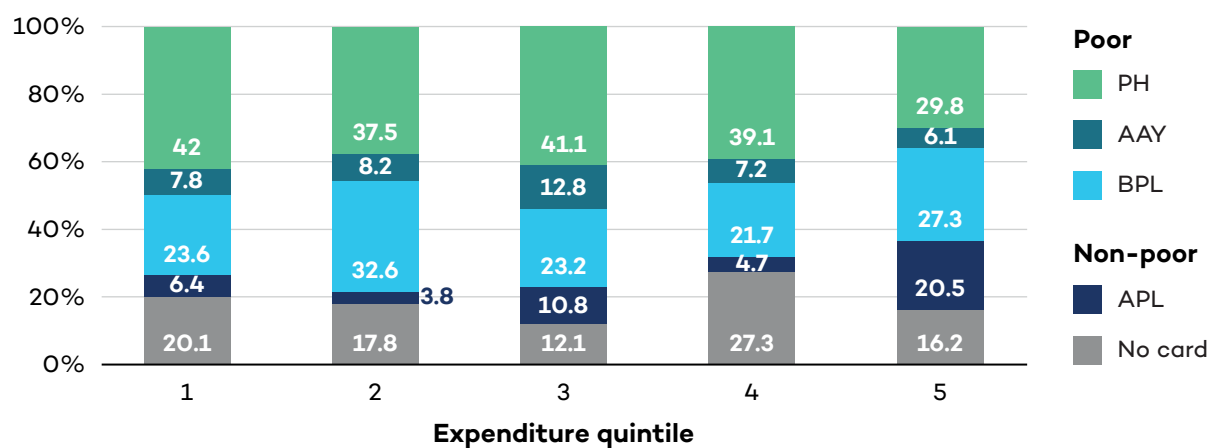
Figure 4. Ration card ownership by rural wealth quintiles



Note: A Chi-square test rejected the hypothesis that the distribution of households was the same across each rural quintile. It failed to reject this hypothesis for urban households.

Source: Survey data

Figure 5. Ration card ownership by urban wealth quintiles



Note: A Chi-square test rejected the hypothesis that the distribution of households was the same across each rural quintile. It failed to reject this hypothesis for urban households.

Source: Survey data

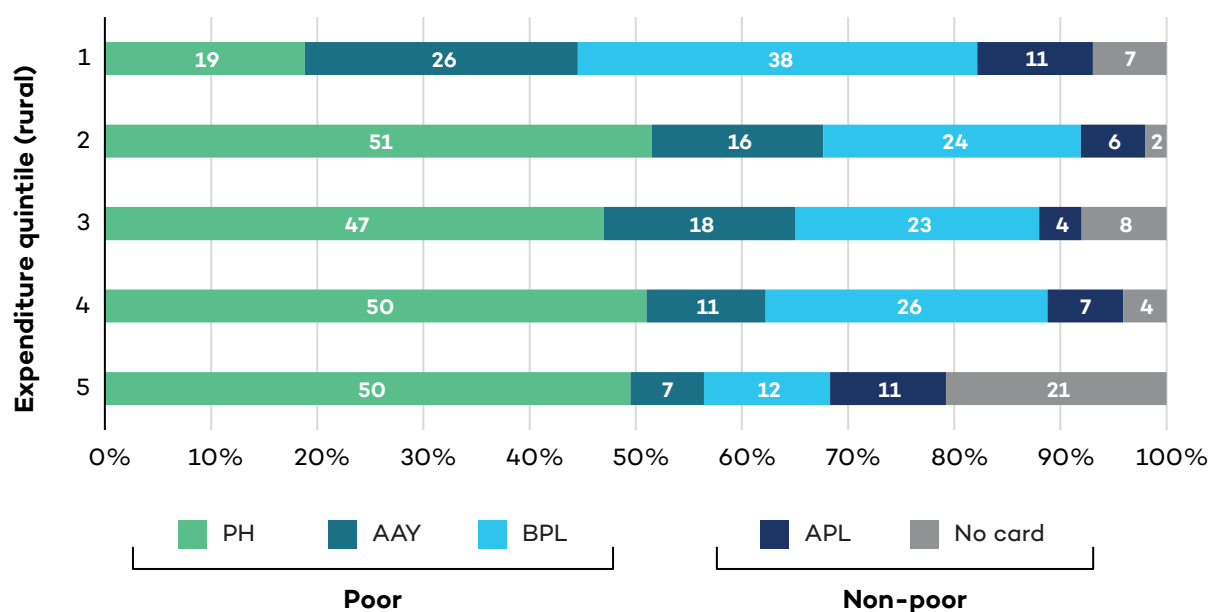


4.0 Who Gets LPG Subsidies Today, and Is the Distribution of Benefits Fair?

4.1 Subsidy Incidence With a Ration Card Approach

The first approach divides the sample into poor and non-poor households, defined according to the type of official ration cards they possess. Households with BPL cards, PH cards, and AAY cards were all included as poor for this analysis, as these households receive subsidized food and fuel.⁹ All the remaining households, namely those that possess an APL card and no-card households, were designated as non-poor. By this method, 81% of surveyed households were identified as poor. That being said, not all households who possess “no card” are necessarily non-poor (see Figures 6 and 7). Some deserving households may not hold a card because of barriers to registration or because they cannot comply with residency laws.

Figure 6. Ration card ownership in rural areas

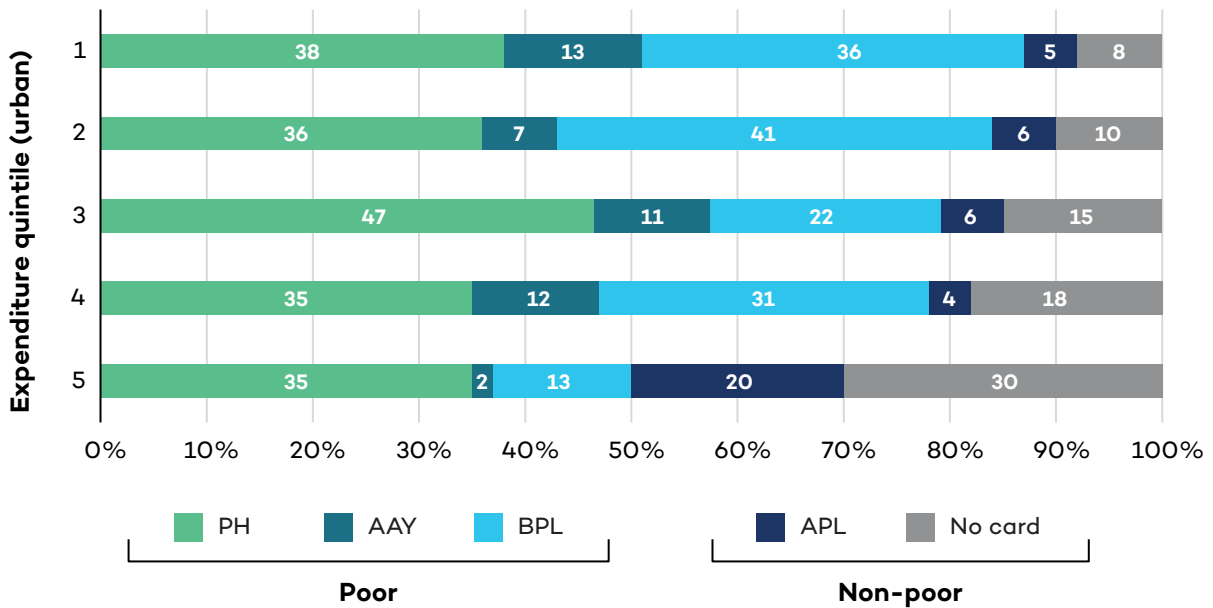


Source: Survey data

⁹ See footnote 5 for a description of the ration card entitlements.



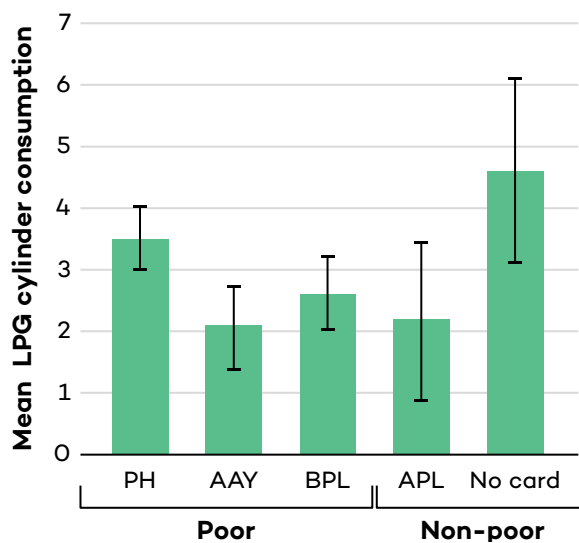
Figure 7. Ration card ownership in urban areas



Source: Survey data

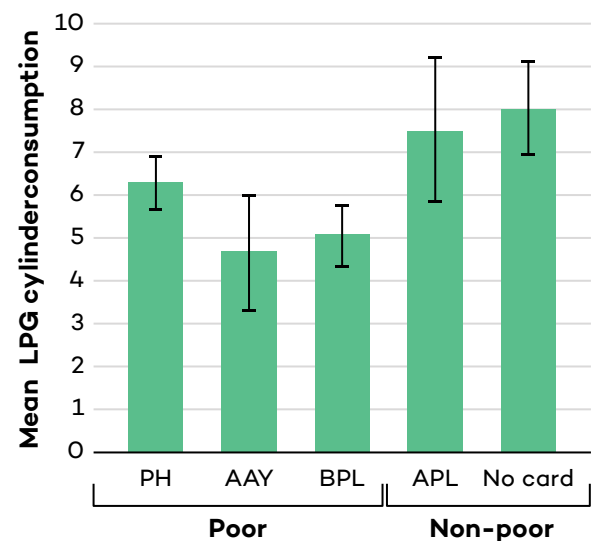
As illustrated in Figures 8 and 9, in both rural and urban areas, the annual consumption of cylinders shows no clear trend among different ration card owners. We might expect BPL, AAY, and PH cardholders to consume less LPG because they are worse off. We see a slight trend like that in urban areas but not in rural areas. We also notice that PHs actually do not seem to consume less LPG than those households without a ration a card or with an APL card.

Figure 8. Annual consumption of cylinders by ration card holders in rural areas



Source: Survey data

Figure 9. Annual consumption of cylinders by ration card holders in urban areas

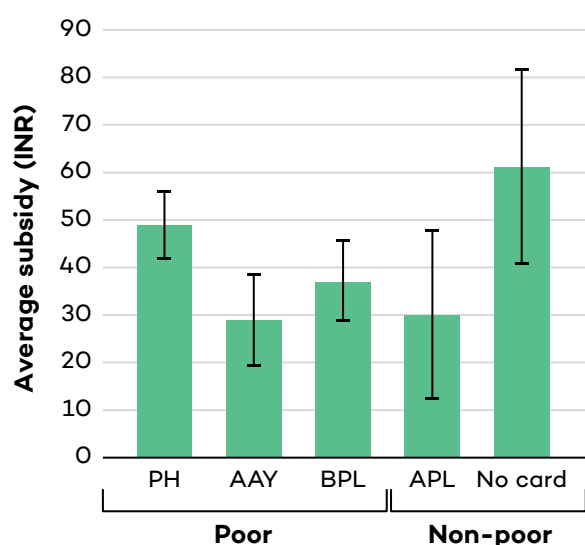


Source: Survey data



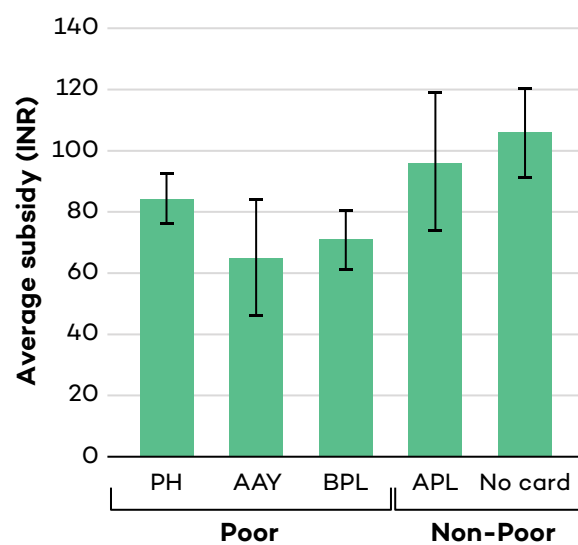
As illustrated in Figures 10 and 11, the mean subsidy per ration-card-owning family already suggests a regressive pattern: that is, a higher share of benefits is captured by the “non-poor” group than the “poor” group. In rural areas, the differences are less clear because APL owners consume relatively little LPG, increasing the margin of error in our estimates. In both urban and rural areas, those with no cards receive the highest average LPG subsidy. For urban households especially, those with BPL and AAY cards receive a lower average subsidy, in line with their lower consumption. PH owners, on the other hand, receive average benefits between the other two groups, again in line with their relatively higher consumption.

Figure 10. Mean LPG subsidy by ration card in rural areas



Source: Survey data

Figure 11. Mean LPG subsidy by ration card in urban areas

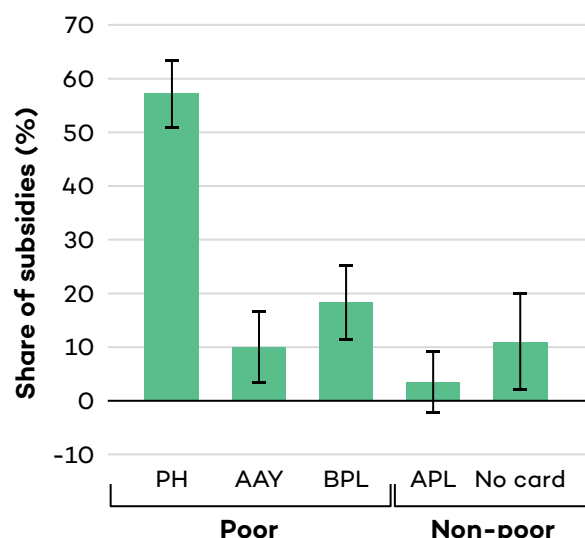


Source: Survey data

In terms of subsidy share, Figures 12 and 13 show a progressive trend. In both rural and urban areas, PHs are the larger group and consequently get the lion’s share of the subsidies, followed at some distance by BPL card owners. In rural areas, those with poverty cards received 86% of total subsidy benefits, while in urban areas, such households received 76%. Those without a poverty card or an APL card receive a relatively low share of the LPG subsidies (15% in rural and 24% in urban areas). These results seem to suggest fairly equitable distribution if we presume that card ownership indeed corresponds well to socio-economic status.

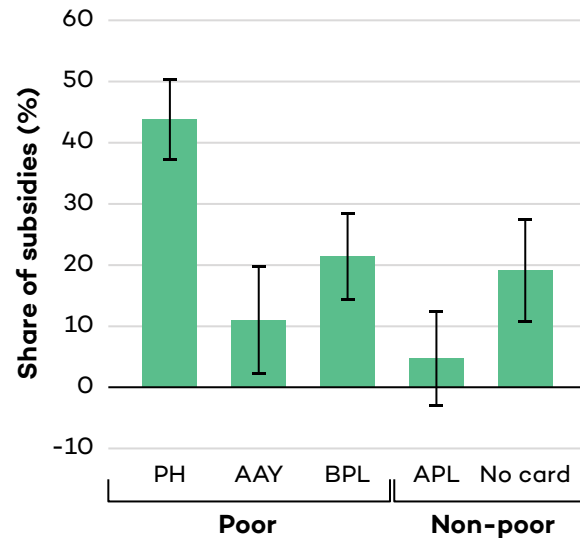


Figure 12. Share (%) of LPG subsidies received by ration card holders in rural areas



Source: Survey data

Figure 13. Share (%) of LPG subsidies received by ration card holders in urban areas



Source: Survey data

4.2 Via an Expenditure Quintile Approach

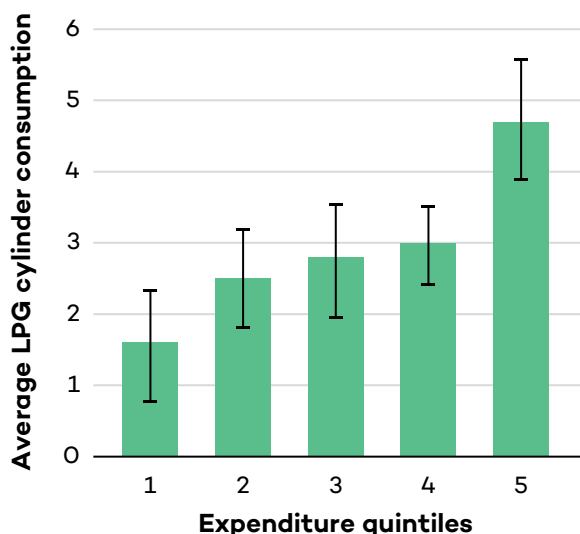
Using an expenditure approach, as illustrated in Figures 14 and 15, we observe that richer households in both rural and urban areas consume more LPG than poorer households. In rural areas, the contrast is starkest. There, the richest quintile consumes just over four cylinders per year, whereas the poorest quintile consumes only 1.6 cylinders on an annual basis. In urban areas, the richest quintile consumes about eight LPG cylinders per year, in comparison with about three cylinders for the poorest quintile.¹⁰

Using a household expenditure metric, in Figures 16 and 17, we can also see that better-off households receive a higher average LPG subsidy than poorer ones. In rural areas, we notice the same regressive distribution, with the richest quintile receiving an average subsidy of INR 65 (USD 0.87) per month, whereas the lowest quintile only receives INR 22 (USD 0.29) per month. Similarly, in urban areas, the richest quintile receives on average INR 113 (USD 1.52) in LPG subsidies per month, versus INR 44 (USD 0.59) in the poorest quintile.

¹⁰ This survey did not ask for the age of the LPG connection and data for households with a connection less than one year old. It has not been manipulated to arrive at an annual estimate.

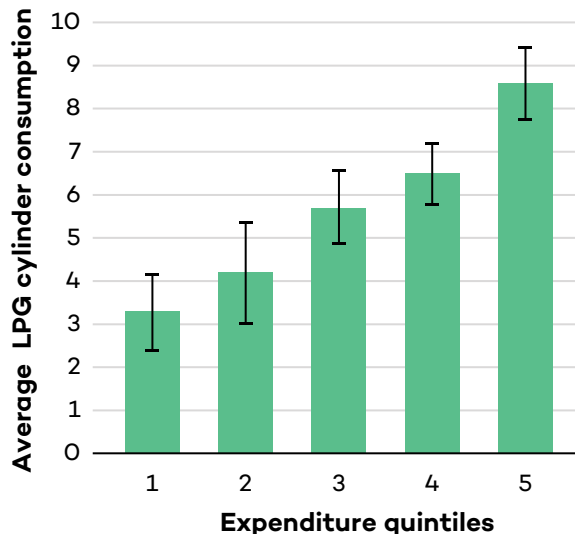


Figure 14. Annual consumption of cylinders by expenditure quintile in rural areas



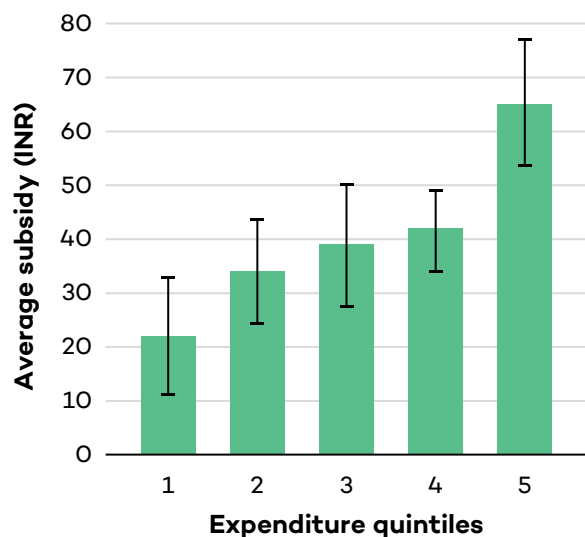
Source: Survey data

Figure 15. Annual consumption of cylinders by expenditure quintile in urban areas



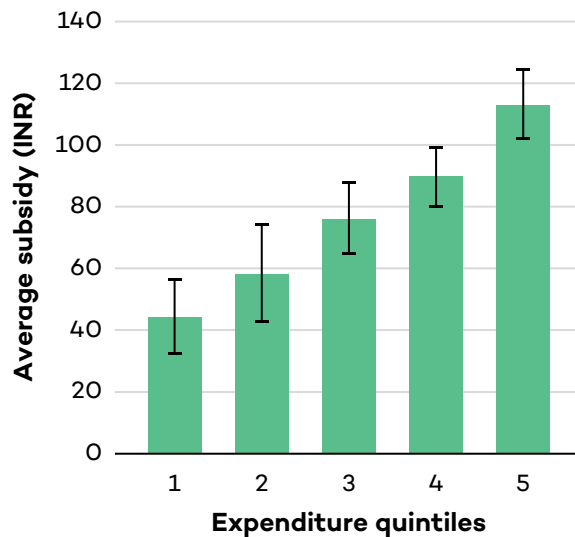
Source: Survey data

Figure 16. Mean LPG subsidy by expenditure quintile in rural areas



Source: Survey data

Figure 17. Mean LPG subsidy by expenditure quintile in urban areas

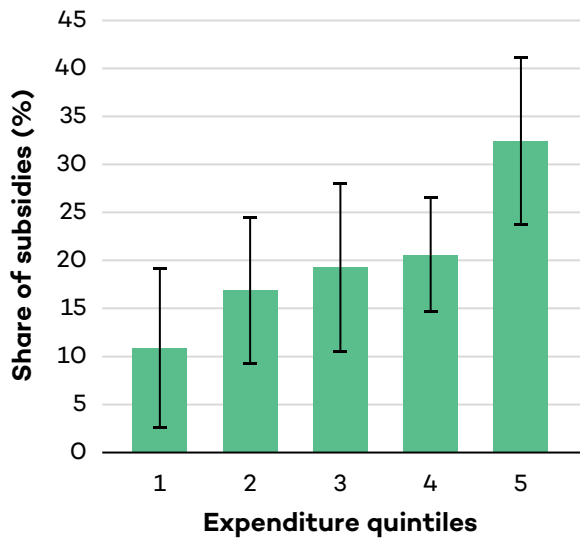


Source: Survey data

Figures 18 and 19 show the share of LPG subsidies by expenditure quintiles, finding them to be highly regressive. In rural areas, the top two quintiles received 53% of the subsidy benefits while the poorest two quintiles only received 28%. In urban areas, the highest two quintiles received 54% of the subsidy benefits while the poorest two quintiles received 27%.

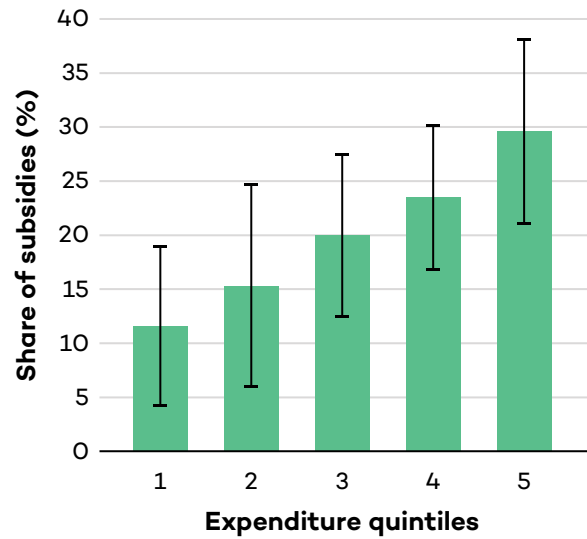


Figure 18. Share (%) of LPG subsidies received by expenditure quintile in rural areas



Source: Survey data

Figure 19. Share (%) of LPG subsidies received by expenditure quintile in urban areas

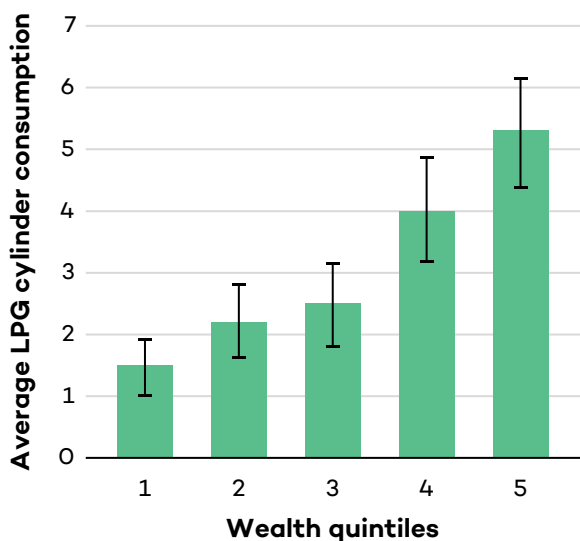


Source: Survey data

4.3 Via a Wealth Quintile Approach

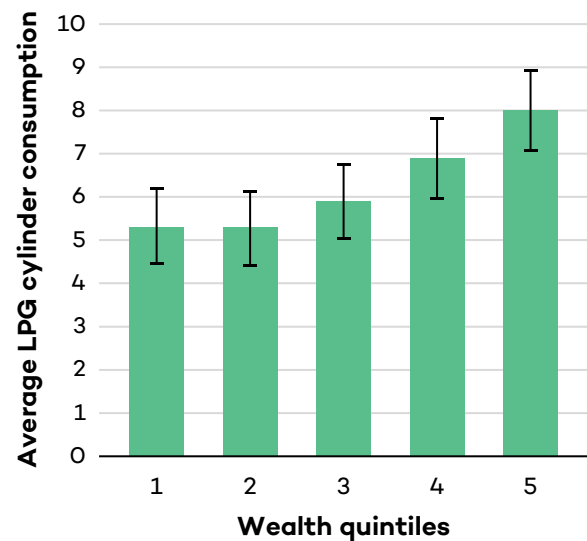
Using a wealth quintile approach, in Figures 20 and 21, we again notice that richer households consume more LPG cylinders per year than poorer ones. In rural areas, the annual consumption of cylinders by wealth quintile or expenditure quintile is nearly identical and shows much higher consumption for richer households than for poorer ones. The difference in urban areas, however, is less stark than when using an expenditure approach.

Figure 20. Annual consumption of cylinders by wealth quintile in rural areas



Source: Survey data

Figure 21. Annual consumption of cylinders by wealth quintile in urban areas

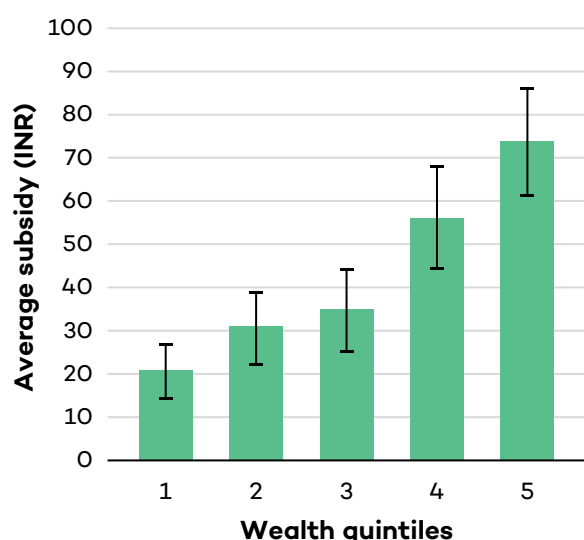


Source: Survey data



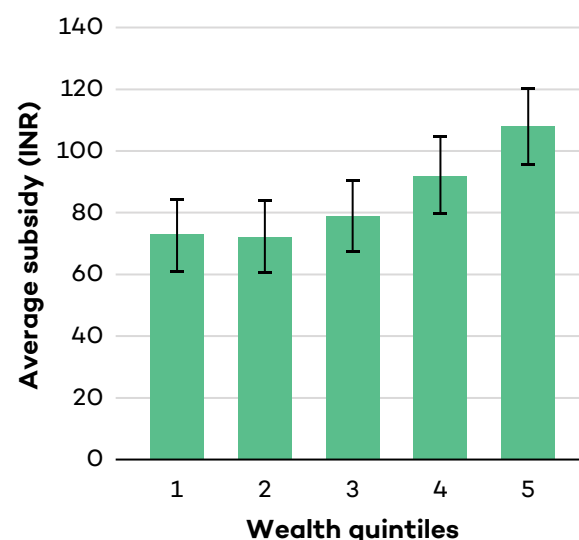
The mean monthly subsidy again shows a regressive pattern, as illustrated in Figures 22 and 23. In rural areas, we confirm a very regressive pattern, with the richest quintile receiving an average LPG subsidy that is more than three times as high as the mean subsidy in the lowest quintile. As can be expected from the consumption figures, the regressive pattern in urban areas is less pronounced in comparison with the pattern observed using the expenditure approach. In this case, the mean subsidy of the lowest and richest quintiles is, respectively, INR 73 (USD 0.98) and INR 108 (USD 1.45) per month, which is substantially less different than when using a household expenditure approach (respectively INR 44 and INR 1.52).

Figure 22. Mean LPG subsidy by wealth quintile in rural areas



Source: Survey data

Figure 23. Mean LPG subsidy by wealth quintile in urban areas

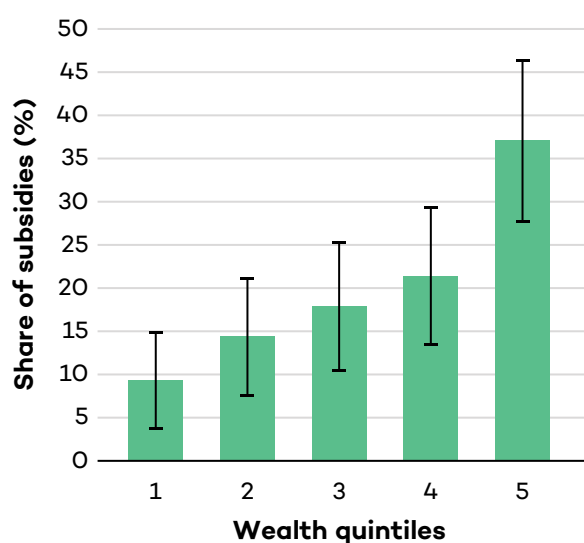


Source: Survey data

Figures 24 and 25 illustrate the regressive distribution of total LPG subsidies in both urban and rural areas. In rural areas, we once again observe a very inequitable distribution of the subsidy. The top two quintiles received 59% of the subsidies, while the poorest two quintiles only received 24%. The highest quintile receives 37% of all LPG subsidies; the poorest quintile only receives 9%. In urban areas, the highest two quintiles received 53% of the subsidy benefits while the poorest two quintiles only received 29%.

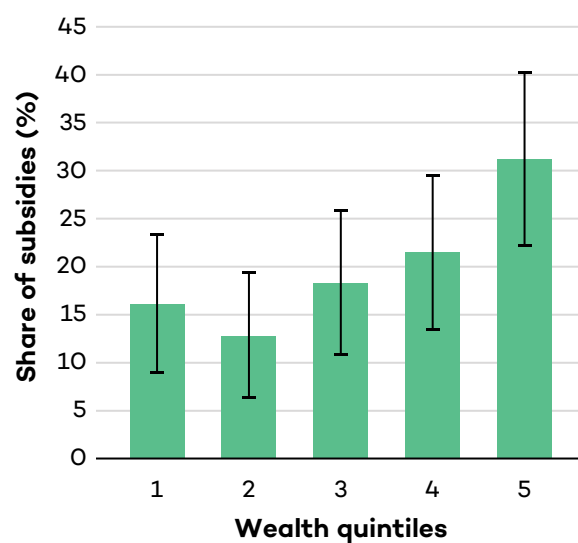


Figure 24. Share (%) of LPG subsidies received by wealth quintile in rural areas



Source: Survey data

Figure 25. Share (%) of LPG subsidies received by wealth quintile in urban areas



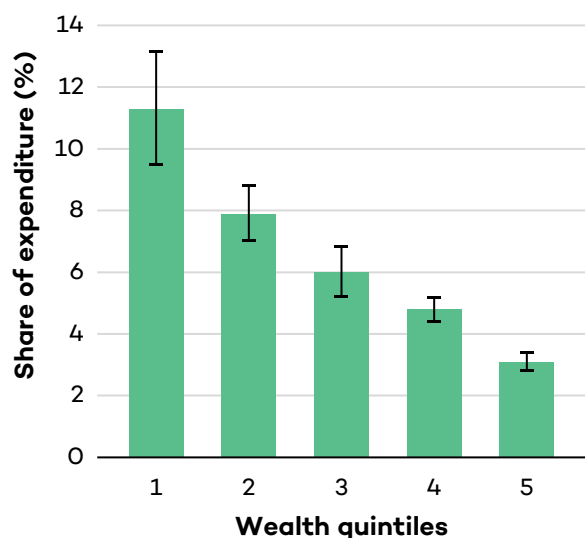
Source: Survey data

4.4 LPG Access and Affordability

Looking into LPG access and affordability can help to better understand some of the findings about subsidy distribution. LPG affordability remains a problem, even with subsidies. Figures 26 and 27 illustrate that in both rural and urban areas, consumers in lower expenditure quintiles spend a much higher share of their monthly expenditure on LPG than those in richer quintiles. And that contrast is not minimal. The richest quintile in rural and urban areas spends, respectively, 3.1% and 3.6% of their monthly expenditure on LPG. The poorest quintiles, on the other hand, spend, respectively, 11.3% and 9.9%. This strongly underlines the continuing problem of LPG affordability for poorer households in both rural and urban areas.

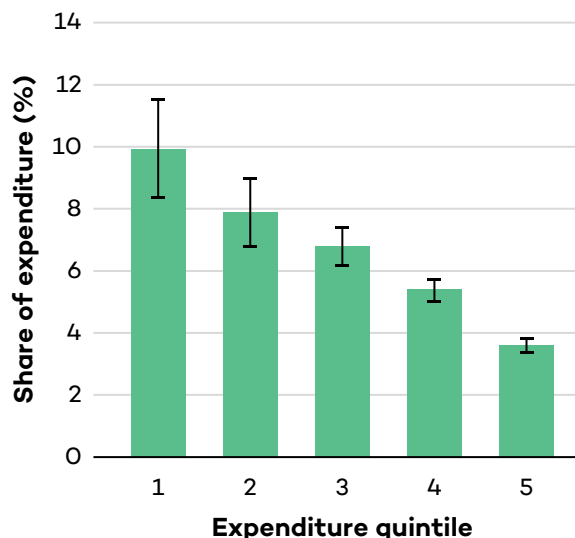


Figure 26. LPG expenditure as share (%) of household expenditure in rural areas, by expenditure quintile



Source: Survey data

Figure 27. LPG expenditure as share (%) of household expenditure in urban areas, by expenditure quintile



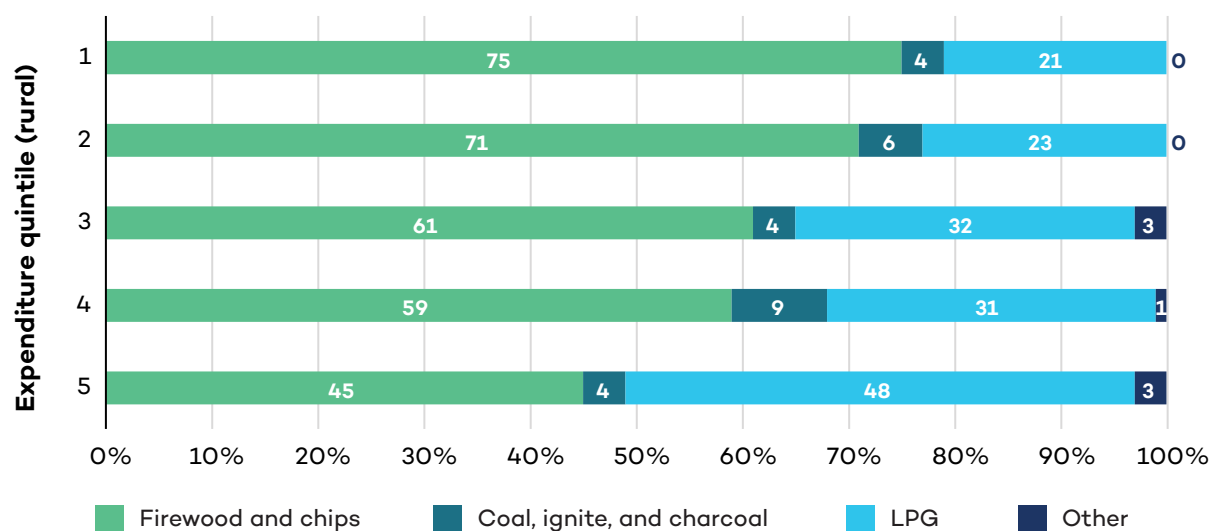
Source: Survey data

As a result of the difficult affordability of LPG refills for poorer households, many poorer households limit LPG consumption and rather continue to use firewood and coal for cooking. Figure 28 illustrates that, in rural areas, the situation is the direst. There, about half of the richest quintile uses LPG as their primary cooking fuel, compared to only 21% in the poorest quintile. But rural households in all wealth groups also continue to use firewood and chips as a primary cooking fuel: 45% of households in the richest quintile and 75% in the poorest rural quintile.

Figure 29 illustrates that in urban households, 27% of the poorest households use firewood and chips as their primary cooking fuel, and an additional 20% still rely on coal, lignite, and charcoal. This may be because of the proximity of coal mines for households in Jharkhand. In total, only half of consumers in the poorest urban quintile use LPG as their primary cooking fuel, compared to 80% of the richest quintile. These results show that there is not only a wide difference between richer and poorer households within a certain area but also a huge difference between rural and urban areas.



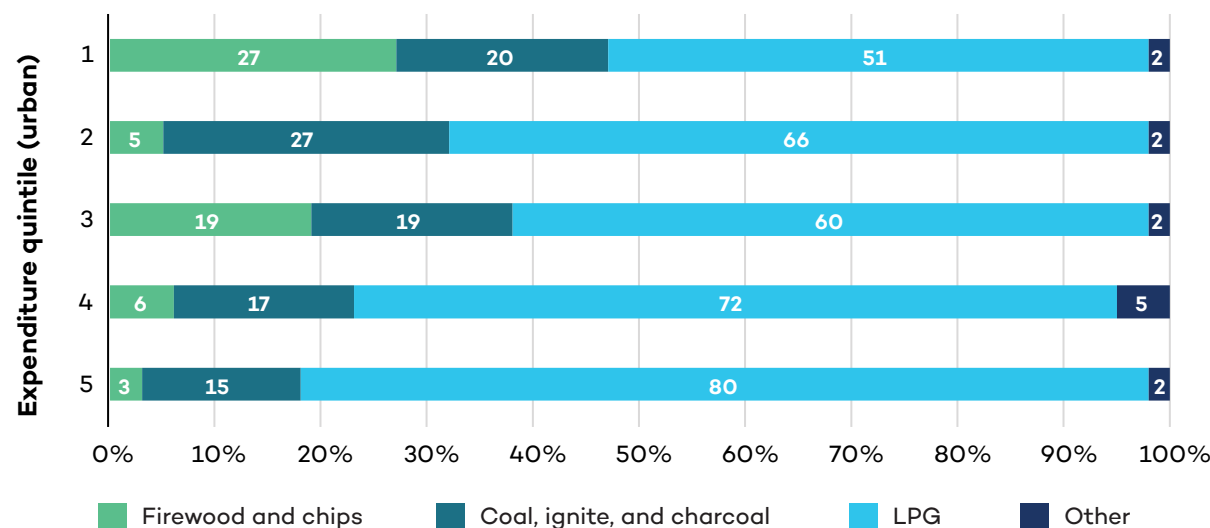
Figure 28. Share (%) of households using primary cooking fuel in rural areas, by expenditure quintile



Note: Other fuels include dung cake, kerosene, biogas, electricity, natural gas, and any other fuel.

Source: Survey data

Figure 29. Share (%) of households using primary cooking fuel in urban areas, by expenditure quintile



Note: Other fuels include dung cake, kerosene, biogas, electricity, natural gas, and any other fuel.

Source: Survey data



5.0 How Would Different Targeting Options Change Subsidy Distribution?

This study finds that LPG subsidy distribution is regressive in Jharkhand, with a large share of subsidies benefiting the non-poor. Improved subsidy targeting can allow for subsidies to be better clustered on the poor while reducing the fiscal stress on the government. But it also needs to be planned very carefully so that it does not accidentally exclude vulnerable households, seriously affecting the affordability of LPG.

This analysis reviews two possible options for improving the targeting of LPG subsidies:

1. Reducing the annual volumetric limits of subsidized cylinders from 12 to 9
2. Increasing the per-cylinder subsidy for PMUY consumers.

These were selected based on a review of options for LPG subsidy targeting in Sharma et al. (2019a), where these interventions seemed to offer the best balance of being theoretically promising, low in administrative cost, and possible to test with our survey data.

In each option, we use expenditure data obtained through the household survey to identify to what extent each of these options would affect subsidy incidence. We find that, in each option, there is no improvement to subsidy incidence because of lower consumption of cylinders by the poorest quintiles. The last section of this chapter therefore explores measures to accurately identify poor households as a means to improve the targeting of LPG subsidies.

It should be emphasized, however, that this analysis does not attempt to project any kind of behavioural change in response to the change in pricing. In reality, we would expect to see an increase in consumption when higher subsidies are offered, improving benefits for the lowest quintiles. But without any data on demand-price elasticity, it is not possible to estimate how this would change outcomes. This lack of data about the relationship between LPG prices and consumption is an important gap that should be addressed by future research.

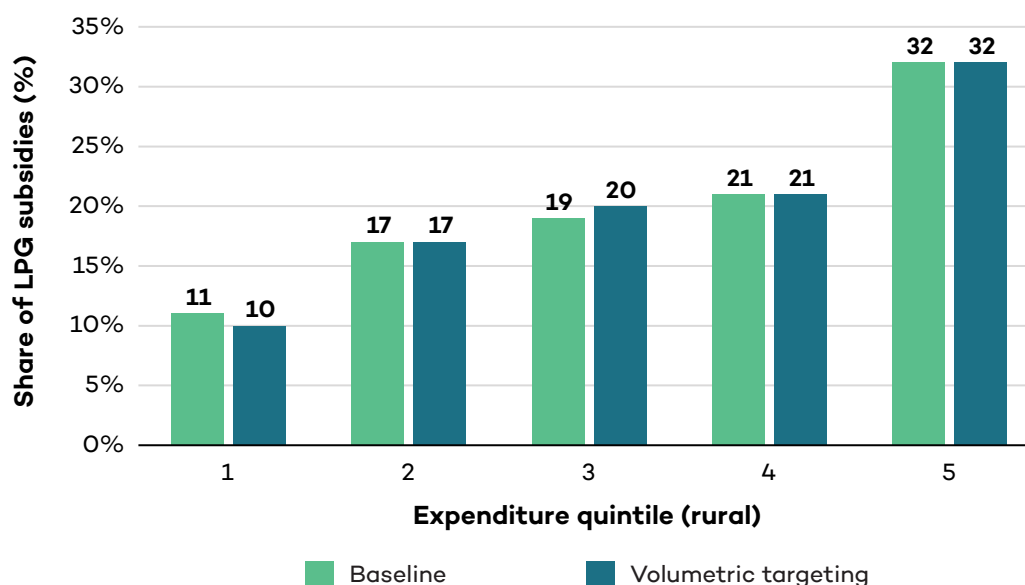
5.1 Volumetric Targeting: Reducing annual volumetric limits from 12 to 9

This targeting option reduces the annual quota of subsidized cylinders from 12 to 9 for each LPG consumer. The government offers 12 subsidized 14.2-kg LPG cylinders annually, but research suggests that consumption of nine cylinders annually can meet 70% of the cooking needs of up to 90% of households (Jain et al., 2014). We hypothesized that reducing the annual quota of subsidized cylinders should therefore reduce the subsidy expenditure on better-off households, saving the government's subsidy expenditure and improving subsidy incidence. This option is also motivated by the fact that some sub-sections of households in all quintiles are consuming above 10 cylinders annually (see Figures 34 and 35, showing the spread of average LPG consumption within each rural and urban expenditure quintile). The limitation of this option is that poor households may use biomass to stack their remaining cooking needs, which adds to household air pollution.



To explore this option, the subsidy per cylinder was removed for households consuming more than nine cylinders. Surprisingly, this downward revision of subsidized cylinders had little impact on the distribution of benefits, as illustrated in Figures 30 and 31, in part because average annual consumption in Jharkhand is low. In rural areas, the top two quintiles saw no change in the share of subsidies received. For the poorest two quintiles, the share of subsidy benefits fell slightly to 27% from 28%. In urban households, the share of benefits decreased slightly for the top two quintiles to 52% from 54%. For the poorest two urban quintiles, the share increased slightly to 29% from 27%. As illustrated in Figures 32 and 33, the average absolute subsidy benefits fell across all quintiles. This reduced overall subsidy transfers by around 14% in rural areas and 19% in urban areas.

Figure 30. Change in share (%) of LPG subsidies received by expenditure quintile in rural areas from volumetric targeting

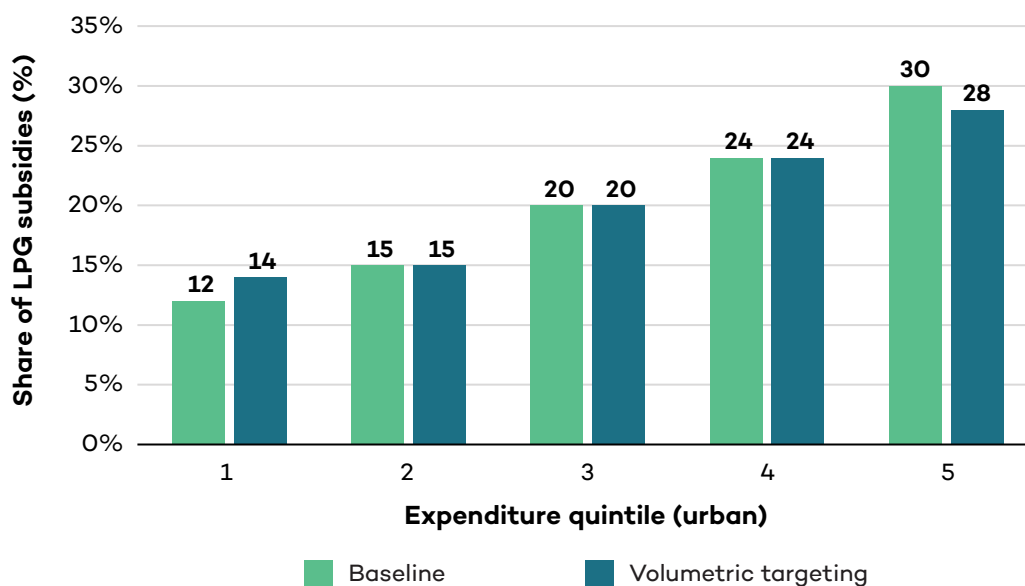


Note: These figures are for the entire sample, including households without an LPG connection

Source: Survey data

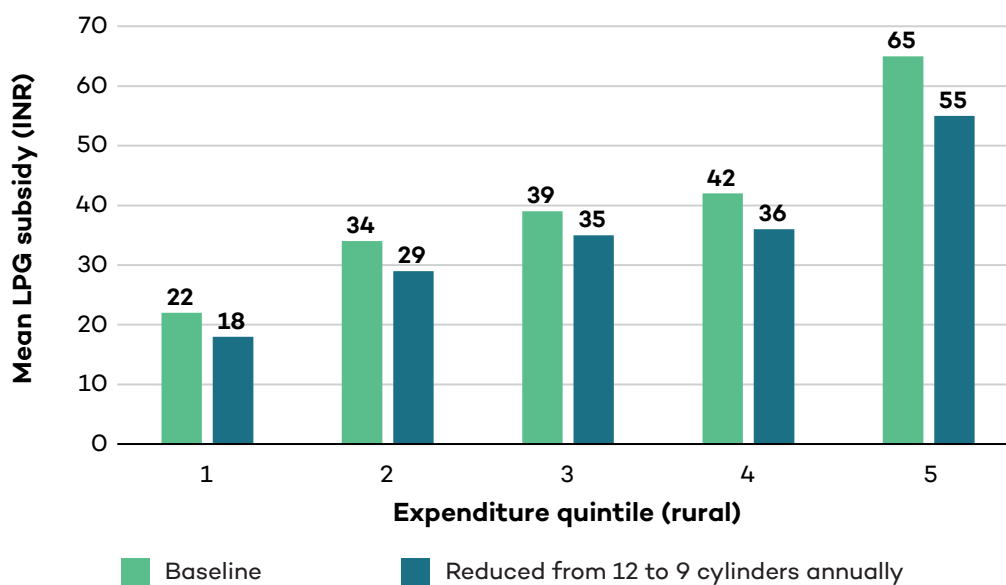


Figure 31. Change in share (%) of LPG subsidies received by expenditure quintile in urban areas from volumetric targeting



Note: These figures are for the entire sample, including households without an LPG connection
 Source: Survey data

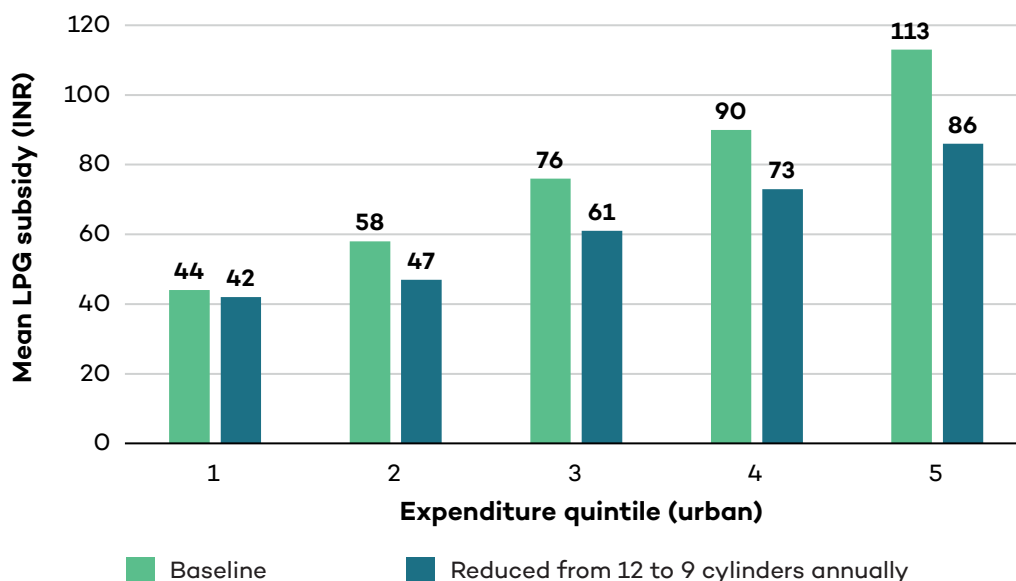
Figure 32. Changes in mean LPG subsidy (INR) received by expenditure quintiles in rural areas from volumetric targeting



Note: These figures are for the entire sample, including households without an LPG connection
 Source: Survey data

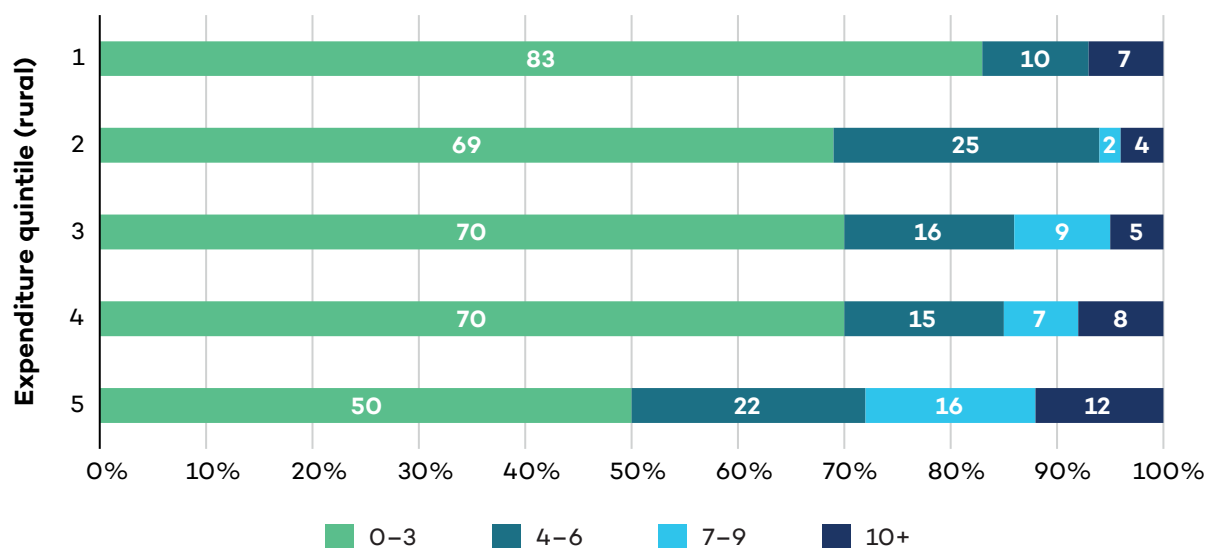


Figure 33. Changes in mean LPG subsidy (INR) received by expenditure quintiles in urban areas from volumetric targeting



Note: These figures are for the entire sample, including households without an LPG connection
 Source: Survey data

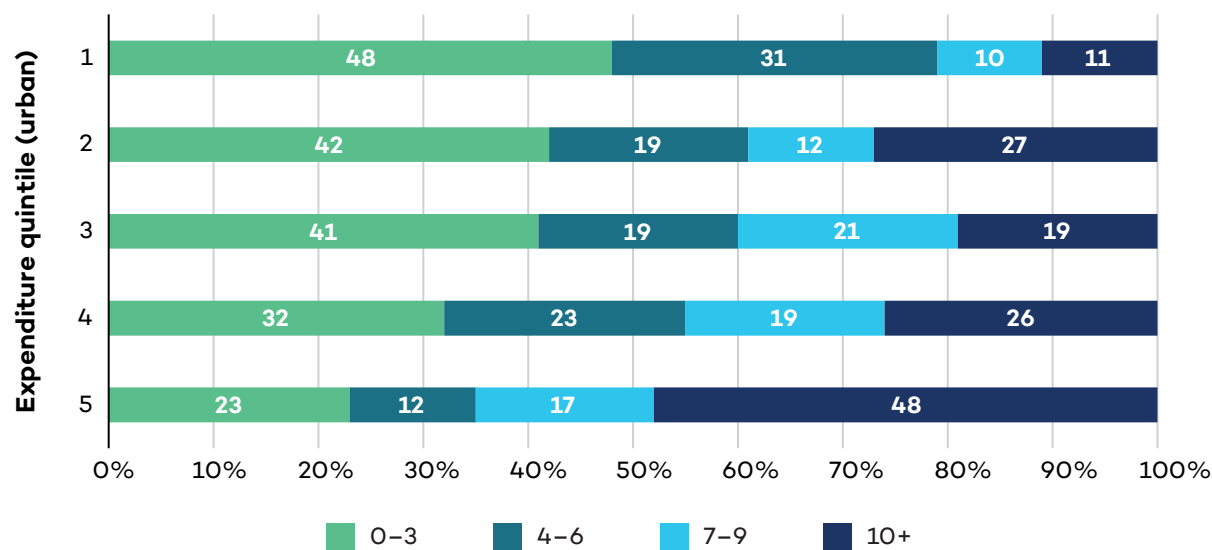
Figure 34. % breakdown of annual LPG cylinder consumption in expenditure quintiles for rural areas



Note: These figures are for the entire sample, including households without an LPG connection
 Source: Survey data



Figure 35. % breakdown of annual LPG cylinder consumption in expenditure quintiles for urban areas



Note: These figures are for the entire sample, including households without an LPG connection

Source: Survey data

Even in contexts where it is more effective in improving subsidy distribution, there are limits to the extent to which volumetric targeting can meet all of India's policy objectives because it cannot increase poor households' consumption of subsidized cylinders—only reduce the share of subsidy accruing to the rich. However, it can limit subsidy expenditure by saving resources that can be redirected toward poor households. In absolute terms, when the cap on subsidized cylinders is reduced from 12 to 9, the mean subsidy falls for all households.

5.2 Differential Subsidy for PMUY: Increasing per-cylinder subsidy for PMUY consumers

This targeting option allocates a higher per-cylinder PAHAL subsidy for beneficiaries of PMUY. We hypothesized that since PMUY is a connection subsidy targeted at women from poor households, giving them a higher per-cylinder subsidy compared to other PAHAL or non-PMUY LPG consumers could help improve subsidy incidence. The main motivation behind this outcome is that PMUY households in poorer quintiles have lower average consumption than PMUY households in higher-income quintiles (see Figures 40 and 41). Figures 42 and 43 show that the percentage of PMUY households is consistently high among different rural and urban expenditure quintiles, except for the poorest rural quintile.

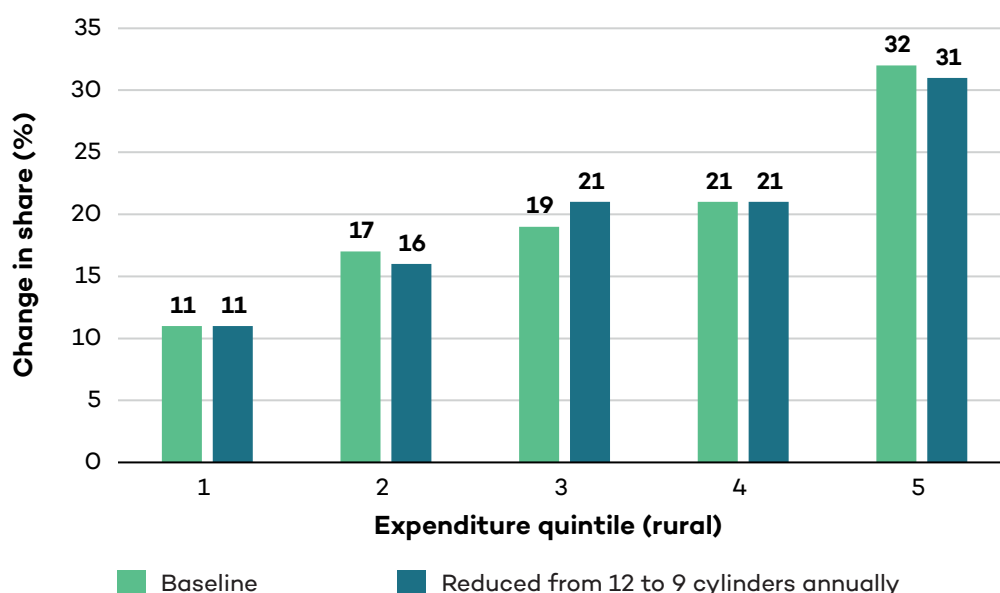
To implement this option, PMUY consumers will receive nine subsidized cylinders annually but at varying rates of subsidy—the first set of three cylinders consumed annually are at a 90% subsidized rate; the second set of three cylinders are at a 60% subsidized rate; the third set of three cylinders are at a 30% subsidized rate; and any cylinders above nine in a year receive no subsidy (sold at the market price). PAHAL users receive a flat 30% subsidy on nine cylinders annually; on any further consumption, they pay the non-subsidized or market price of the cylinder.



We observed that this option also had a limited impact on improving the distribution of benefits, as illustrated in Figures 36 and 37. In rural areas, more subsidies continued to accrue to the top two quintiles—they now received 52% of the benefits, compared to 53% earlier. And for the poorest two quintiles, subsidy benefits nearly remained the same, at 27% compared to 28% earlier. Similar results are observed in urban households. The top two urban quintiles received 51% of the subsidy benefits compared to 54% earlier, while the poorest two urban quintiles received 29% of the subsidy benefits compared to 27% earlier. Increasing the per-cylinder subsidy for the poorest households can improve affordability, but it cannot, alone, improve the distribution of LPG subsidies.

However, despite the regressive distribution of benefits, the total average benefit per quintile does increase considerably (see Figures 38 and 39). While this would improve affordability for poor households, it would also significantly increase overall scheme costs—a 168% increase in subsidies in rural areas and a 128% increase in subsidies in urban areas.

Figure 36. Change in share (%) of LPG subsidies received by expenditure quintile in rural areas from differential subsidy

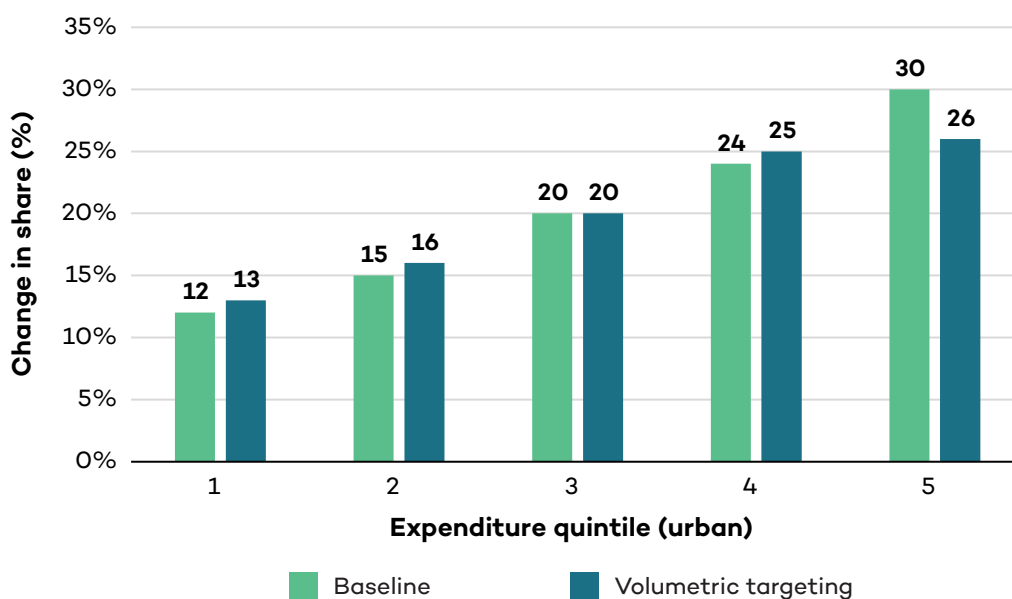


Note: These figures are only for households with a PMUY connection.

Source: Survey data



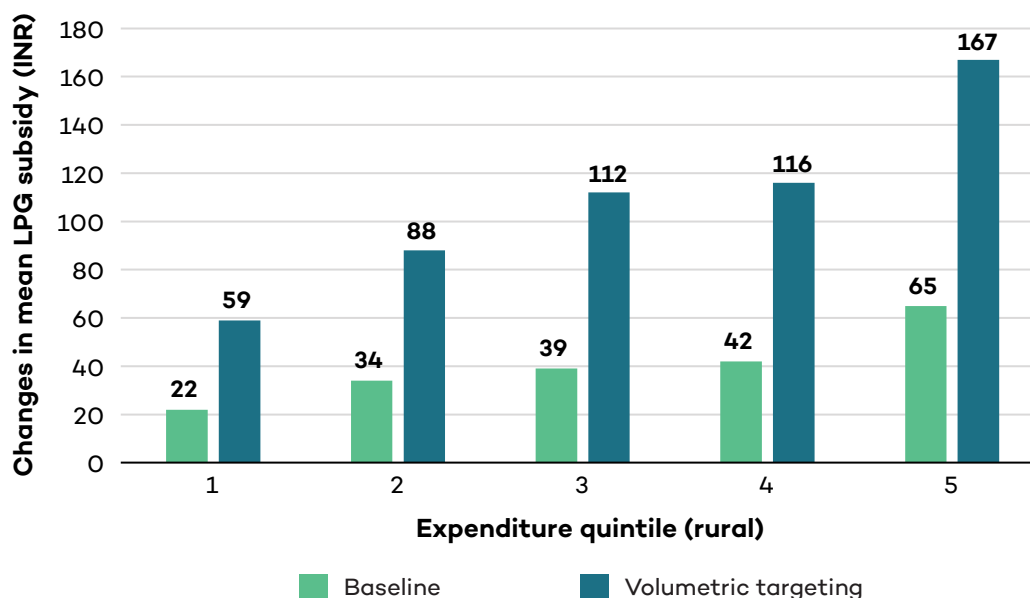
Figure 37. Change in share (%) of LPG subsidies received by expenditure quintile in urban areas from differential subsidy



Note: These figures are only for households with a PMUY connection.

Source: Survey data

Figure 38. Changes in mean LPG subsidy (INR) received by expenditure quintiles in rural areas from differential subsidy

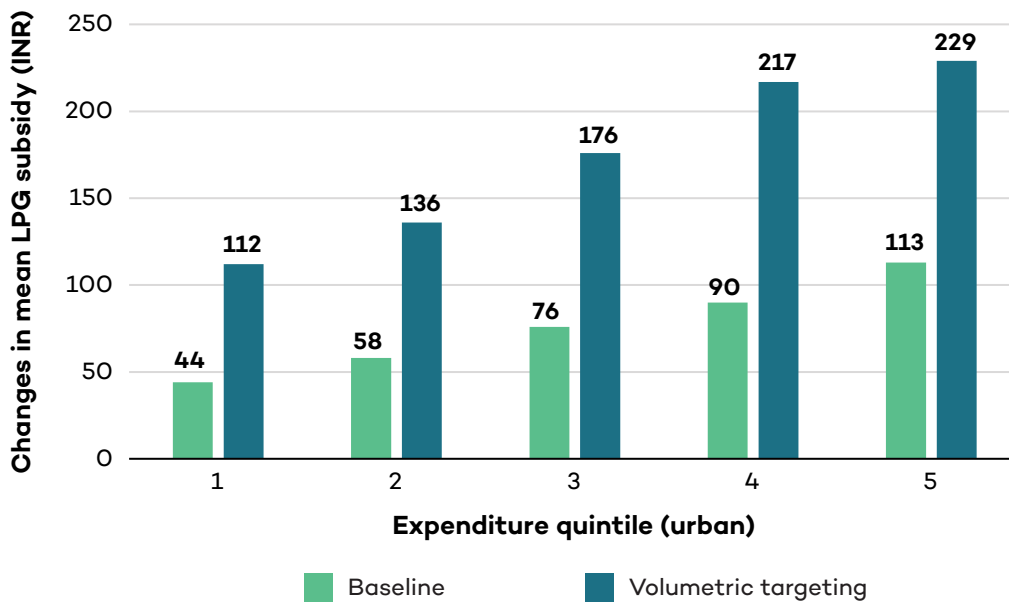


Note: These figures are only for households with a PMUY connection.

Source: Survey data



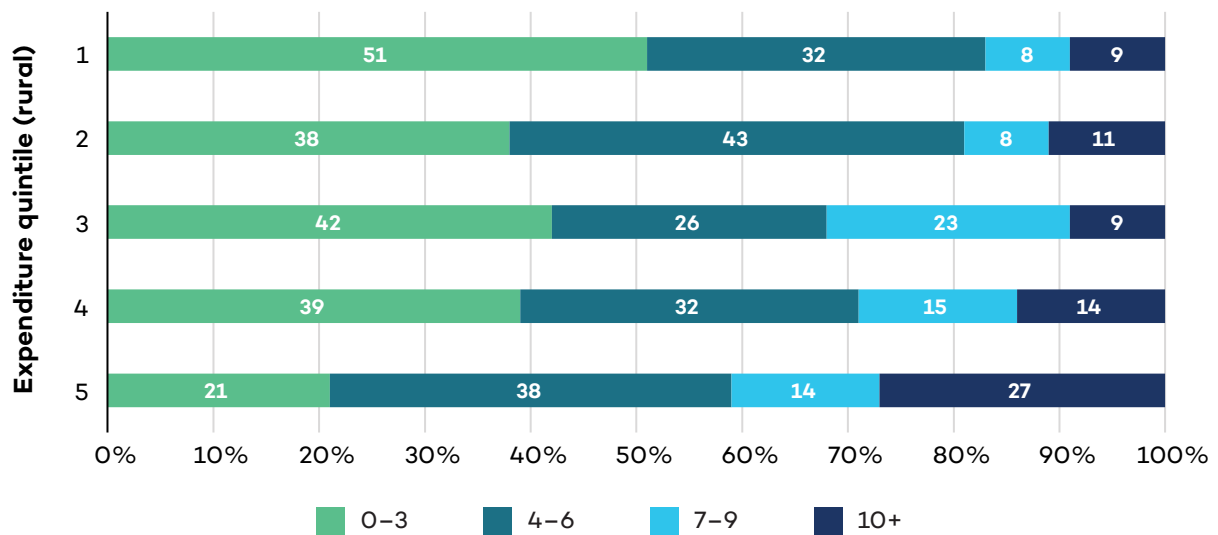
Figure 39. Changes in mean LPG subsidy (INR) received by expenditure quintiles in urban areas from differential subsidy



Note: These figures are only for households with a PMUY connection.

Source: Survey data

Figure 40. % breakdown of annual LPG cylinder consumption in expenditure quintiles for PMUY consumers in rural areas

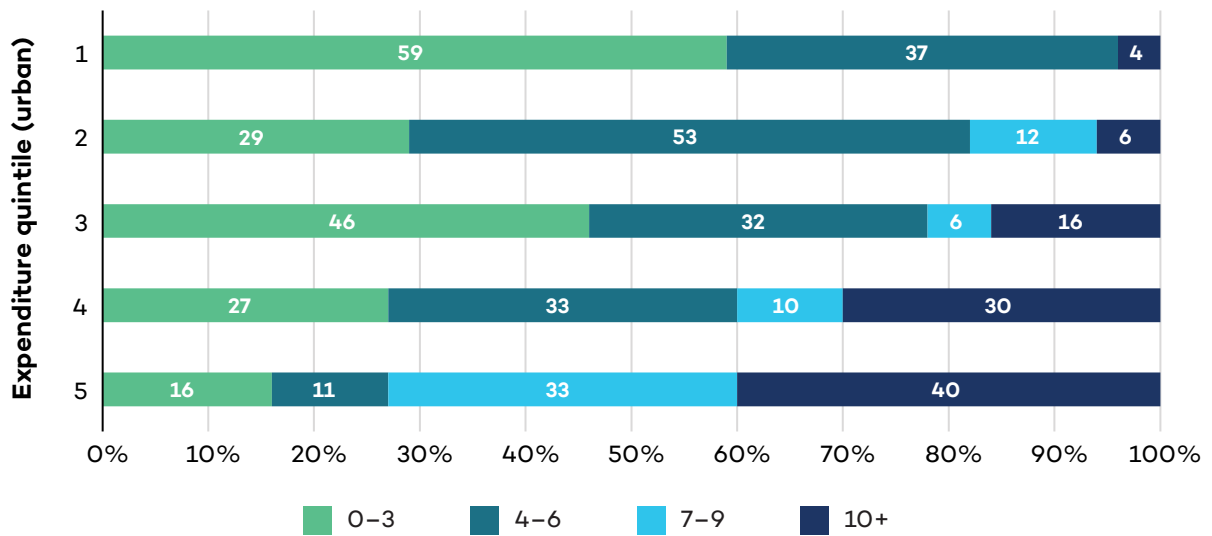


Note: These figures are only for households with a PMUY connection.

Source: Survey data



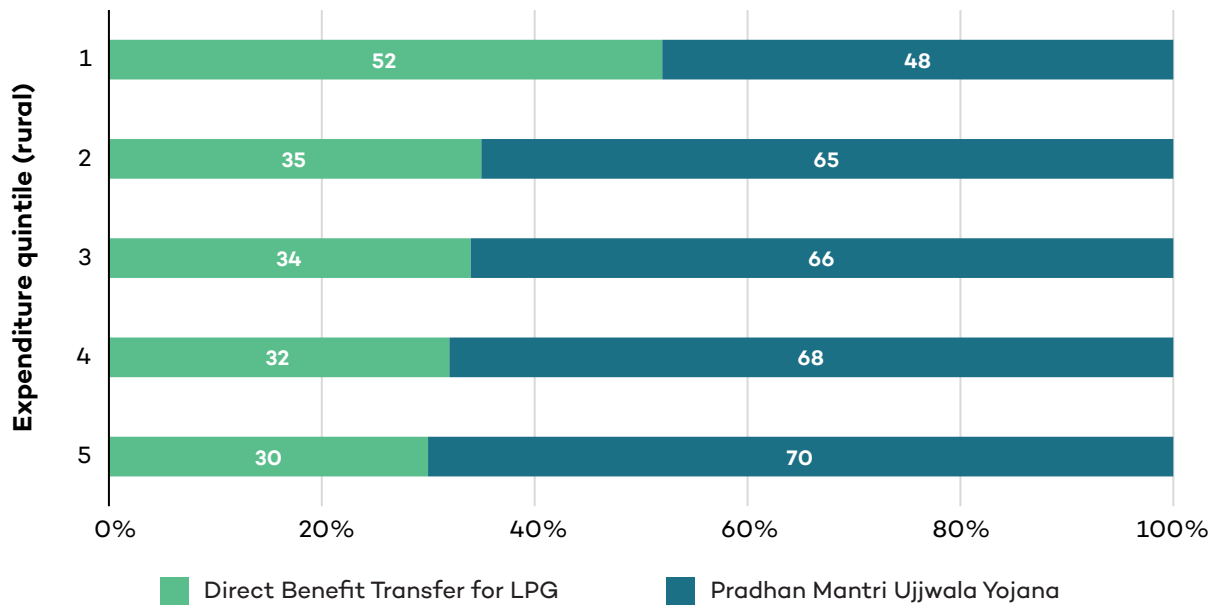
Figure 41. % breakdown of annual LPG cylinder consumption in expenditure quintiles for PMUY consumers in urban areas



Note: These figures are only for households with a PMUY connection.

Source: Survey data

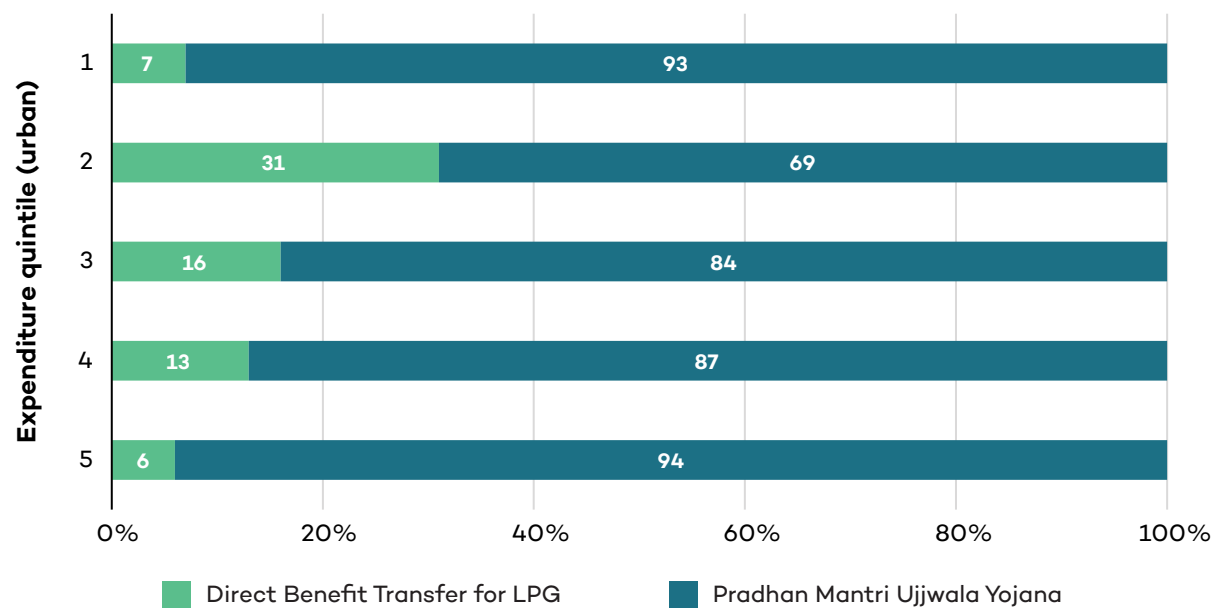
Figure 42. % breakdown of households by type of LPG connection in various rural expenditure quintiles



Source: Survey data



Figure 43. % breakdown of households by type of LPG connection in various urban expenditure quintiles



Source: Survey data

5.3 Implications of Results

None of our theoretically promising and low-administrative-cost options performed well in improving LPG subsidy targeting. This suggests that further efforts are required to explore other strategies.

One approach would be to explore further options identified in Sharma et al. (2019a), including geographic or categorical targeting that adjusts the rules to determine a subsidy based on smart indicators that can be used to filter out better-off households (for more details, see Box 2).

Another approach would be to step back and consider linkages between the challenge of LPG subsidy targeting and bigger picture efforts to develop an accurate registry of poor households as part of national social protection efforts—an endeavour that goes far beyond the needs of only one energy access policy. Such a registry could be used by national and state governments to improve the delivery of numerous welfare schemes. The need for such administrative capacity has been particularly stark during the last year, when the government needed to protect the welfare of poor households during the COVID-19 crisis; however, some poor households, like migrant labourers, were left excluded. A unified registry of poor households could improve the government's ability to provide targeted assistance in numerous situations.

The creation of such a registry is extremely challenging in such a large and diverse population, but a number of variables could be used in the poverty census to help build toward this objective in a stepwise approach.



Box 2. Further possibilities to explore: Indicators to filter out better-off consumers

This report uses a rural and urban wealth index constructed from 17 variables, largely influenced by the SECC. The wealth index uses factor analysis to combine these variables.

Factor analysis combines several input variables in (unobserved) factors. We relied on expert literature to select various variables that typically may reflect the wealth of a household. These are the level of education of the household head, ownership of transportation devices, ownership of cattle, housing features (number of rooms in the house, number of tables, number of chairs), availability of drinking water, availability of toilets, whether the house is owned by the respondent, whether they use subsidized grain, whether they partook in NREG, and how much land they possess (see Annex B for more details).

Upon observing that our initial options for improved targeting did not perform well, we decided to investigate whether or not any variables in the index might be particularly good at predicting better-off households. If so, one option might be to explore whether or not it would be possible to exclude certain households from LPG subsidies based on certain characteristics that are highly correlated with higher wealth levels.

We found that the input variables that have the highest weight in the creation of our index are: whether the respondent owns a motorbike, how many rooms their house has, how many beds they own, and how many chairs they have. Using these four variables, a newly constituted index has a correlation coefficient of about 0.82 (rural) and 0.78 (urban) with the one we used in this report. Thus, these four variables together could offer a relatively effective way to predict a household's wealth level without creating an unrealistic data collection burden. Such proxy approaches are not perfect but should at least be explored to see if they could be acceptable in practice, perhaps taking into account "opt-in" clauses so that households who feel that they have been unfairly removed from benefits can simply re-subscribe.

It is important to emphasize that these variables were found to be good predictors of better-off households in this specific survey in Jharkhand, where poverty levels are higher compared to national averages.¹¹ They may not equally well predict better-off consumers in other regions. Previous poverty censuses that have used extensive variables have been criticized for their methodology and lack of quality data. There is a need to further examine and shortlist such variables to better understand options for identifying better-off households.

¹¹ In 2016, the poverty rate in Jharkhand was 46% (Centre for Fiscal Studies, 2020, p. 15), compared to the national poverty rate of 28% (Business Standard, 2018).



6.0 Conclusions and Recommendations

6.1 Conclusions

To improve the affordability of LPG, the Government of India has implemented two key policies: cash transfers to support the costs of LPG consumption (the PAHAL or DBTL scheme) and “connection” subsidies to pay the up-front costs of converting to LPG, which focuses on women from poor households (the PMUY scheme). In light of high subsidy costs—INR 54,518 crore (USD 8.15 billion) in FY 2019 (Garg et al., 2020)—the government has experimented with several measures to improve targeting, including a voluntary opt-out scheme (called Give It Up) and income limits.

Despite these efforts, we estimate that subsidies in Jharkhand are still highly regressive—that is, a higher share of benefits is going to better-off households. Because there is no one accepted way to define richer or poorer households, this study explores three different approaches: (1) ration cards, (2) household expenditure, and (3) a wealth index (a multi-criteria score based on ownership of non-electric assets and socio-economic status). The results are summarized in Table 5. While subsidies seem relatively well distributed based on ration cards, this reflects the fact that a majority of households in Jharkhand own ration cards, and they may not be well correlated to wealth levels. Both the expenditure and wealth index approaches find a strong regressive distribution.

Table 5. Summary of main findings

	Rural	Urban
Ration card approach	Among rural households, those owning the poverty ration cards receive 86% of the total subsidy, while non-card-holding households only receive 15% of the total subsidy.	Among urban households, those owning poverty ration cards receive 76% of the total subsidy, while non-card-holding households receive 24% of the total subsidy.
Expenditure approach	Among rural households, the top two quintiles received 53% of the total subsidy, while the poorest two quintiles received only 28% of the total subsidy.	Among urban households, the top two quintiles received 54% of the total subsidy, while the poorest two quintiles received only 27% of the total subsidy.
Wealth index approach	Among rural households, the top two quintiles received 59% of the total subsidy, while the poorest two quintiles received only 24% of the total subsidy.	Among urban households, the top two quintiles received 53% of the total subsidy, while the poorest two quintiles received only 29% of the total subsidy.

This study then explored two options to improve subsidy targeting, but neither of them performed well in improving subsidy distribution, as summarized in Table 6.



Table 6. Summary of targeting options to improve LPG subsidy targeting in Jharkhand

Option	Description	Results
Volumetric targeting	This targeting option reduces the annual quota of subsidized cylinders from 12 to 9 for each LPG consumer.	This did not change incidence, and it continued to be regressive: better-off households received a higher share of subsidy benefits while poorer households received a smaller share. But this option reduced subsidy expenditure, as it reduced subsidy transfers by 14% in rural areas and by 19% in urban areas.
Differential subsidy for PMUY consumers	This targeting option allocates a higher per-cylinder PAHAL subsidy only for beneficiaries of PMUY, such that the first set of three cylinders consumed annually is at a 90% subsidized rate, the second set is at a 60% subsidized rate, and the third set is at a 30% subsidized rate, with consumers paying market rates after their ninth refill.	This increased the average subsidy received by all groups but also made no significant change to subsidy incidence. In rural areas, the richest 40% now received 52% of benefits compared to 54% earlier. The poorest 40% saw subsidy benefits fall to 27% from 28% earlier. Similar results were observed among urban households. It should be noted, however, that these estimates assumed no change in consumption patterns as a result of higher subsidies.

6.2 Recommendations

This report has tested and analyzed several options but did not identify a “magic bullet” for easily improving LPG subsidy distribution among poor households. The main bottleneck in improving subsidy distribution appears to be the low consumption of subsidized LPG cylinders among poor households and the high consumption among better-off households. Subsidies therefore accumulated to better-off households with higher consumption of subsidized LPG cylinders.

In May 2020, the dramatic decline in world oil prices resulted in a large decrease in LPG cylinder prices, effectively removing any LPG subsidies per cylinder. Since then, both oil prices and LPG cylinder prices have seen a high upward revision, with prices reaching pre-COVID levels. At the time of writing this report, there has been no clarity on whether the LPG subsidies will be reintroduced, but it is anticipated that demand for their return can only grow. This has put a spotlight on the affordability of unsubsidized LPG cylinders: the COVID-19 crisis has severely impacted incomes, and many households are anticipated to fall back into poverty, further stressing the need to provide support for affordable clean cooking for the most vulnerable. This report discusses the potential for “subsidy targeting”: suggesting that any reintroduction of LPG subsidies should focus benefits on those most in need while reducing them for better-off consumers.



Based on the results of the different targeting approaches tested, this report makes the following recommendations:

- **Map the knowledge gap:** This study demonstrates that LPG subsidies are highly regressive in Jharkhand. A dedicated effort is needed to identify the equity of LPG subsidies across India in order to better concentrate policy attention on this problem. Routinely undertaking this exercise can reduce the time gap between the availability of data and improved policy design. For OMCs, a cost-effective method could be to conduct telephone surveys several times per year using a simplified version of the questionnaire employed by this study. The Ministry of Statistics and Programme Implementation can also conduct detailed energy consumption surveys through the census and the National Sample Survey Office to make such data routinely available.
- **Test targeting interventions:** Poverty is contextual, and this report tested interventions for Jharkhand, a state with high poverty. Many of the approaches tested here may yield different results for other states. Further work could also be done to continue this study's tentative exploration of indicators that could be used to restrict subsidies from higher-income households. In Jharkhand, for example, we found that motorbike ownership was a strong predictor of non-poor households. In other states with higher per capita income, more expensive vehicles like cars or agricultural vehicles could be explored as predictors of the non-poor. Finally, there are also other potential targeting options that we were not able to test in this study. This includes geographic targeting, which has been relatively effective in a number of global studies on social protection. Categorical social targeting can be used by leveraging both national and Jharkhand-level women-centric schemes. The Ministry of Petroleum, along with OMCs, should invest in testing different interventions to target subsidies without compromising LPG access and affordability.
- **Work with poverty experts to solve the bigger problem of effectively identifying low-income households:** There may well be limits to the extent that ministries and departments of energy alone can improve LPG targeting without some bigger-picture-thinking about India's administrative capacity to effectively identify low-income and better-off households. Engagement with social protection agencies can identify opportunities for learning and convergence with other social welfare schemes, as well as good practice with respect to factors such as gender in targeting and policy implementation. The MoPNG should coordinate with other ministries—such as rural development, drinking water and sanitation, housing and urban affairs—and state-level departments who are in more advantageous positions to capture more granular data in order to improve the current database. This will help in the strategic roll-out of future schemes, particularly PMUY 2.0, that target exclusive biomass fuel users and focus on their LPG adoption.



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Annex A. Estimating Monthly LPG Subsidy

Households with a liquefied petroleum gas (LPG) connection were asked whether their LPG connection was under the Pradhan Mantri Ujjwala Yojana (PMUY) scheme or the Direct Benefit Transfer for LPG (DBTL)/Pratyaksh Hanstantrit Labh Yojana (PAHAL) scheme. They were also asked about their annual LPG cylinder consumption. As the subsidy per cylinder varies every month, an average subsidy per cylinder was calculated from May 2019 to March 2020 and found to be INR 172.87 (USD 2.45) for PMUY users and INR 157.79 (USD 2.24) for DBTL users (see table A1)

Subsidies for both PMUY and DBTL households were calculated by multiplying annual consumption (in cylinders) with the average subsidy per cylinder. This annual estimate was then divided by 12 to reach monthly LPG subsidy estimates.

Table A1. Monthly market prices and subsidy for LPG cylinders from May 2019 to March 2020

Month	Market price of domestic LPG 14.2-kg cylinder (INR) in Delhi	PMUY LPG subsidy per 14.2-kg cylinder (INR)	Non-PMUY LPG subsidy per 14.2-kg cylinder (INR)
May 2019	712.5	216.36	216.36
June 2019	737.5	240.13	240.13
July 2019	637	142.65	142.65
August 2019	574.5	71.71	50.71
September 2019	590	79.62	58.62
October 2019	605	87.05	66.05
November 2019	681.5	155.9	134.9
December 2019	695	164.76	143.76
January 2020	714	178.86	157.86
February 2020	858.5	312.48	291.48
March 2020	805	252	231

Source: MoPNG 2019a–g, 2020a–d



Annex B. Wealth Index

The wealth index is influenced by the Socio-Economic Caste Census (SECC) and uses many of its variables. The final list of variables used in the construction of the wealth index is listed in Table B1. The wealth index uses factor analysis to combine these variables. The output of factor analysis is a variable that has a mean of zero and a standard deviation of one. A larger score means that the household is wealthier compared to the other households in the dataset. Households were then divided into five categories based on their wealth index. These quintiles are all of equal size (i.e., they contain the same number of households).

Separate wealth indexes were established for urban and rural households, reflecting the typically large divide in well-being between urban and rural areas. For this reason, the wealth index of a rural household cannot easily be compared to the score of an urban household.

Table B1. List of variables used in the construction of the wealth index

No.	Type of variable	Variable
1	Exclusion	Households with any member earning more than INR 10,000 per month
2	Exclusion	Households owning 2.5 acres or more of irrigated land with at least one piece of irrigation equipment
3	Exclusion	Household owning 5 acres or more of irrigated land for two or more crop seasons
4	Exclusion	Households owning 7.5 acres or more of land with at least one piece of irrigation equipment
5	Exclusion	Households having a Kisan credit card with the credit limit of INR 50,000 and above
6	Exclusion	Households with three or more rooms with pucca walls and a pucca roof
7	Inclusion	Destitute or living on alms
8	Inclusion	Manual scavengers
9	Inclusion	Primitive tribal groups
10	Inclusion	Only one room with kucha walls and a kucha roof
11	Inclusion	No adult members between ages 18 to 59
12	Inclusion	Female-headed households with no adult male member between ages 16 to 59
13	Inclusion	Scheduled caste or scheduled tribe households
14	Inclusion	No literate adult above 25 years

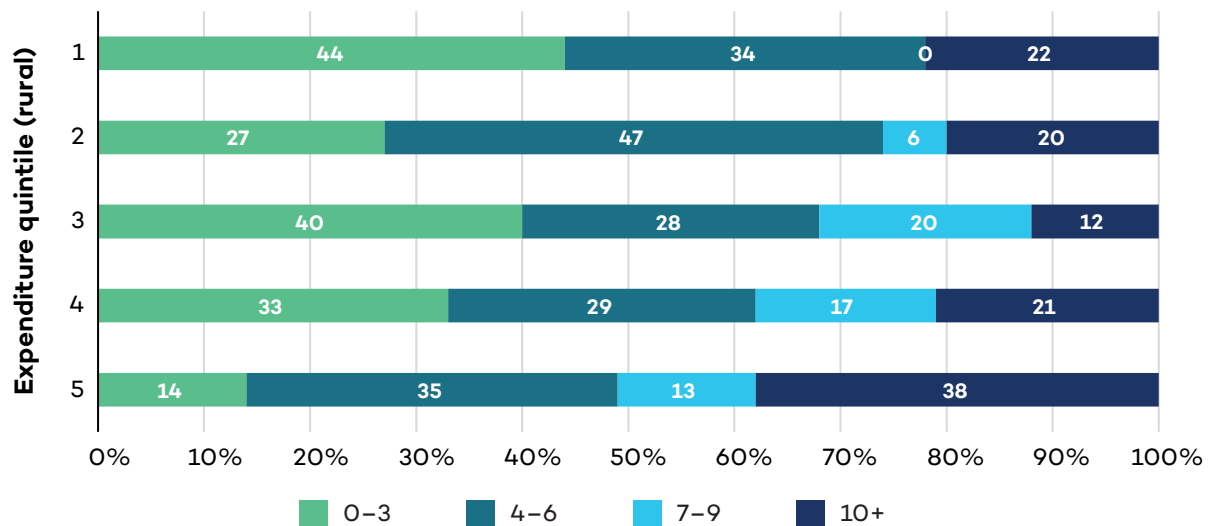


No.	Type of variable	Variable
15	Inclusion	Landless households deriving a major part of their income from casual manual labour
16	Inclusion	If household member(s) were employed under NREGA in the last year
17	Inclusion	If the household purchased subsidized food grains in the last 30 days



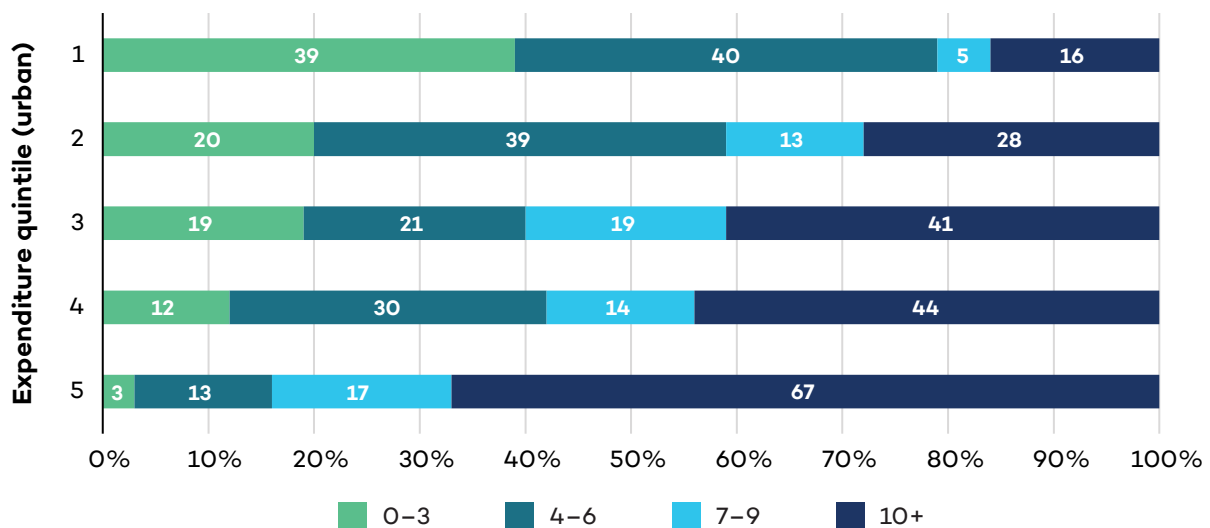
Annex C. Supporting Figures

Figure C1. % breakdown of annual LPG cylinder consumption in expenditure quintiles for rural areas



Source: Survey data

Figure C2. % breakdown of annual LPG cylinder consumption in expenditure quintiles for urban areas



Source: Survey data

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