Working Paper

# PROMOTING CLEAN AND AFFORDABLE COOKING:

# SMARTER SUBSIDIES FOR LPG

Alok Tripathi, Ministry of Petroleum and Natural Gas[1]

Ambuj D. Sagar, Indian Institute of Technology Delhi[2]

Kirk R. Smith, University of California Berkeley

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Department of Humanities and Social Sciences
Indian Institute of Technology Delhi
Hauz Khas, New Delhi 110016

[1] The views in this paper are the personal views of the author and not of his organization.

[2] Contact at asagar@hss.iitd.ac.in

## Household air pollution and health

Cooking with biomass and coal in India is now recognized to cause major health problems with greatest risks in women and their young children in poor populations. The recent Global Burden of Disease Study estimates that more than 10 lakh premature deaths each year occurs in India from the household air pollution due to these polluting cookfuels with another 1.5 lakh due to their contribution to general outdoor air pollution in the country (Lim et al., 2012, Chafe et al., 2014). Although the fraction of the Indian population using clean cookfuels, such as LPG, natural gas, and electricity, is slowly rising, the number using polluting solid fuels as their primary cookfuel has remained static for nearly 30 years at about 700 million. This has been termed "India's Chulha Trap" and indicates that simply waiting for development to solve the problem has not been effective (Smith and Sagar 2014).

The way these health estimates are done is to compare the pollution exposures and consequent health impacts of using solid fuels with those of people using the most prevalent clean cookfuel, liquefied petroleum gas (LPG), which, essentially is the gold standard for household cooking energy both for reasons of convenience, which makes adoption easier, and its clean combustion. Thus, enhancing the availability of, and access to, LPG has been the primary way to reduce the premature deaths due to household air pollution caused by polluting dirty cookfuels since the health impacts of solid fuels could just as well be termed the health impacts of not using LPG.

### *Status of household LPG today*

Many countries, including India, have already been making significant efforts to enhance the use of LPG for household cooking in their populace.

Consumption of LPG in the country was about 16 million tonnes (MMT) during financial year 2013-14 (MoPNG 2014). Out of the total LPG sales in the country, around 90% is for household use and rest for non-household sectors such as glass cutting industries and petrochemical industries. Although Government of India (GoI) has allowed the sale of LPG in the household sector by private companies (known as parallel marketers), their share in total LPG sale is miniscule in comparison to the share of the three government Oil Marketing Companies (OMCs), Indian Oil Corporation, Bharat Petroleum Corporation, and Hindustan Petroleum Corporation. This is because the GoI provides subsidy to every LPG consumer of the country, if he/she is registered with OMCs.

The OMCs market LPG in the household sector through a network of 15267 distributors spread across the country (MoPNG 2015). At present there are two types of distributorship models in country. Regular distributors are appointed to sell LPG primarily in urban and semi-urban areas. In order to increase LPG coverage in rural areas, the Government launched a smaller distributorship model in 2009 known as Rajiv Gandhi Gramin LPG Vitran Yojana (RGGLVY). As on 31st December 2014, just 4058 RGGLVs had been commissioned across the country (MoPNG 2015), with another 5000 RGGLVs underway at various stages. As a result of these and other efforts undertaken by GoI, LPG coverage has

increase substantially. There are over 170 million LPG connections in the country, covering almost two-thirds of households (MoPNG 2015), although in many cases, this LPG may be used alongside other traditional – and cheaper – options such as biomass, which is referred to as cookfuel "stacking." Indeed, the 2011 census indicates that only 29% of households (11% of the rural, 65% of the urban) use LPG as their primary cookfuel. Everyday more than 3 million LPG cylinders are being delivered throughout the country making it one of the largest LPG delivery networks in world. However the use of LPG as primary fuel in rural area is still low especially in less-developed states such as UP, Bihar, Chattisgarh, and Odisha where LPG coverage is merely 6 %, 3 %, 2 % and 3 % respectively.

The traditional system of providing gas cylinders at subsidized cost has an unfortunate side-effect: a significant fraction of the cylinders have been diverted for non-household uses since the subsidized price is much lower than the market price of LPG.

### *Streamlining and tightening the subsidy process*

On Jan 1, 2015, the Ministry of Petroleum and Natural Gas launched the Direct Benefits Transfer (DBT) ("Pahal") scheme in the entire country. As of this date, all LPG cylinders are now sold at market price and any subsidy will be transferred directly to the consumer in his/her bank account. (The difference between the market price and the subsidized price in January was Rs. 288). Although the main objective of this scheme is to reduce the leakage of the subsidy for unauthorized use, it was also expected that a small percentage of LPG consumers would not join the scheme and thus would be excluded out of subsidy regime.

It is expected that the Pahal scheme would reduce the Rs. 50,000 crore annual LPG subsidy burden by 10-15% (i.e., Rs. 5,000-8,000 crore); partly from reduction in diversion to non-household purposes and partly due to some people not participating and thus purchasing at full market price. A hefty sum indeed!!

Pahal scheme is a big step forward in that it can help stanch the flow of subsidies to non-household LPG consumption.. Now the next important issue to be addressed is the targeting of LPG subsidies in the country. As the 2012-13 Economic Survey noted (MoF 2013), in rural areas, 0.07 per cent of the subsidies go to the poorest quintile as opposed to 52.6 per cent for the richest quintile. In urban areas, lowest quintile still receives only around 8.2 per cent of the subsidies. Thus while LPG subsidies have played an important role in expanding the access to LPG, directing the subsidies to the poorest and the most vulnerable would confer the greatest benefits of these expenditures. In fact, the Finance Minister in his 2015 Budget Speech noted that "[s]ubsidies are needed for the poor and those less well off."[3]

In Table 1, based on the 68th round report of the National Sample Survey on Monthly per Capita Expenditure, we have analyzed the fraction of the monthly

3 See http://indiabudget.nic.in/ub2015-16/bs/bs.pdf

mean expenditure of households (MMHE) that is required for LPG (monthly usage of 7.9 kg), if bought at an approximate market rate of Rs. 70/kg.[4]

Table 1

| Decile of Expenditure | Monthly Mean Household Expenditure (MMHE)§ | | Percentage of MMHE required for LPG | | Requisite subsidy (Rs/kg) to keep fuel costs < 5% of MMHE | | Requisite subsidy (Rs/kg) to keep fuel costs < 10% of MMHE | |
|---|---|---|---|---|---|---|---|---|
| | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban |
| 0-10 | 2909 | 3702* | 19.1 | 15.0 | 51.7 | 46.7 | 33.3 | 23.3 |
| 10-20 | 3838 | 5143* | 14.5 | 10.8 | 45.8 | 37.6 | 21.6 | 5.1 |
| 20-30 | 4432 | 6268 | 12.5 | 8.9 | 42.1 | 30.5 | 14.1 | **NS** |
| 30-40 | 4987 | 7474 | 11.1 | 7.4 | 38.6 | 22.9 | 7.1 | **NS** |
| 40-50 | 5566 | 8683 | 10.0 | 6.4 | 34.9 | 15.3 | **NS** | **NS** |
| 50-60 | 6204 | 10030 | 8.9 | 5.5 | 30.9 | 6.8 | **NS** | **NS** |
| 60-70 | 6991 | 11721 | 7.9 | 4.7 | 25.9 | **NS** | **NS** | **NS** |
| 70-80 | 8062 | 14089 | 6.9 | 3.9 | 19.2 | **NS** | **NS** | **NS** |
| 80-90 | 9837 | 17906 | 5.6 | 3.1 | 8.0 | **NS** | **NS** | **NS** |
| 90-100 | 17242 | 35953 | 3.2 | 1.5 | **NS** | **NS** | **NS** | **NS** |

NS : NO SUBSIDY

§ Monthly household expenditure data calculated from the monthly per-capita expenditure data from the 68th round of the National Sample Survey (MoSPI 2013); average family size in urban areas: 4.6 persons; average family size in rural areas: 4.9 persons (2011 Census).

*Shading indicates BPL groups

Summary implications of the table:

- For the richest 60% in rural area and richest 80% in urban areas, the use of LPG for household energy already would account for less than or equal to 10% of the monthly household consumption.
- For the poorest 10% in rural areas, however, the cost of unsubsidized LPG would be close to 20% of monthly household consumption.
- Alternatively, even if households are willing to commit only 5% of their total monthly expenditure on cooking fuel, the richest 40% urban households still do not need a subsidy.

Under current conditions, however, everyone receives the subsidy, no matter what their income. The table, however, highlights the need to target the subsidy to the poor rather than utilizing government funds to continue subsidies to better-off households.

In order to reduce the number of well-off consumers from benefiting from the subsidy regime, the Government currently provides the "Opt out of Subsidy" option. Under this scheme, a person wishing to give up the subsidy can do so either online or by making a request directly to his LPG distributor. This is a voluntary scheme and so far over one-million households have given up the subsidy.

[4] We use Rs. 70/kg as an estimate of the average market price circa 2015 (since the price has fluctuated over recent times between Rs. 50/kg and Rs. 90/kg).

### *Smarter subsidies: Better targeting the poor*

We suggest that the GOI in addition to Pahal scheme should also change the default nature of household LPG connection to help focus the subsidy to those who need it the most, in line with the recognition by the Finance Minister to rationalize subsidies.[5]

Currently, every household LPG connection issued to a family by OMCs is a subsidized connection in which twelve 14.2 Kg cylinders per annum are available to LPG consumers at subsidized price. In our suggested modification, as a default, all household LPG connections (new as well as existing ones) would be non-subsidized connections. In other words, customers would not automatically be eligible for subsidy. In order to avail of the subsidy, consumers will have to **opt in** for the subsidy by self-certifying that their household income is less than some specific amount, which would have to be determined and what we call here the national LPG threshold (NLT).. Once the person self certifies that he/she is eligible for the subsidy,[6] he/she will then be able to enroll under Pahal scheme to receive the direct subsidy transfer in in his/her bank account. This will be done without any independent verification, i.e., on the honor system.

Behavioral studies have shown that choice of default options (i.e., opt-in or opt-out) can have a significant impact on the outcome and therefore the default option becomes an important policy choice (Thaler and Sunstein (2008)). For example, an opt-out model of organ donation (i.e., where the default option is agreeing to donate one's organs, but with a choice to opt-out of the donation process) results in much higher levels of participation than an opt-in model (where the person has the option to sign up to donate their organs, but if they do not do so, the default is to remain outside the organ donation program) (Johnson and Goldstein 2003). Similarly, differences in program participation are observed between opt-in and opt-out models of pension savings, where the participation in a pension scheme is much lower if people have to actively opt-in to the scheme versus a model where the default is participation but giving people the choice to opt out (Nessmith, Utkus and Young, 2007). Such a difference in outcomes obviously has significant public policy implications. If a particular option is preferable from a public policy perspective (e.g., higher levels of pension-scheme participation or organ donation), then the choice of default policy can "nudge" (or "budge") individuals into making the preferred choice (Oliver 2013). This is the rationale behind our proposal to move from an opt-out to an opt-in model for the subsidy.

<u>Special case of the poorest households</u>

One income threshold that is now widely used and accepted in India is the designation of National Poverty Line. Few of households below national poverty

[5] *Op. Cit. 1*

[6] Of course, if reliable household income data were available, self-certification would not be needed, but this is not the case in India today. However, if current trends in IT-enabled data collection continue, this might change in the near future.

line, however, use LPG even at the subsidized rate because even then it represents too much of their low incomes (especially if living in areas where free or nearly free biomass can be gathered for cookfuel).

These poorest households, given their particularly precarious economic conditions and high vulnerability medical expenditures due to disease, might require special consideration. What might that look like? For 2011-12, for rural areas the National Poverty Line using the Tendulkar methodology is estimated at Rs. 816 per capita per month and Rs. 1,000 per capita per month in urban areas. Thus, for a family of five, the all-India poverty line in terms of consumption expenditure would amount to about Rs. 4,080 per month in rural areas and Rs. 5,000 per month in urban areas, (although the poverty lines vary from state to state because of inter-state price differentials) (Planning Commission 2013) We can conclude, therefore, that families below the poverty line would be at the 3rd decile class and below in case of rural area and in 2nd decile class and below in urban areas, as shown in Table 1.

The percentage of persons below the Poverty Line in 2011-12 was estimated as 25.7% in rural areas, 13.7% in urban areas and 21.9% for the country as a whole. In terms of number India had 270 million persons below the National Poverty Line (Planning Commission 2013).

Therefore, we suggest that as a further refinement of the subsidy regime, a separate category become available for the poorest households. The subsidy provided to such households would be equal to an amount, which would make their expenditure on cooking fuel less than 5% of their total monthly expenditure. Thus, for a market price of LPG @Rs.70 per kg this amount may be fixed at Rs. 50 per kg, which is close to the requirement for the poorest decile class. [7]

Our proposed approach

Therefore our full proposed revised approach towards targeting subsidy would be:

1. Persons applying for new connection would have to self-certify that their household income is less than the NLT if they wish to receive the standard subsidy designed to keep net LPG costs no more than 8% of expenditures .If he/she possesses the BPL card[8], he/she would submit the relevant documents also to be eligible for an additional subsidy to keep LPG costs less than 5% of expenditure.
2. For BPL card holders, the information would be verified from the state government which maintains BPL households list.

[7] The steps taken by the Ministry of Petroleum and Natural Gas to offer smaller cylinders (5 kg) should also make it easier for the poor to access LPG, since the immediate outlay for a small cylinder is lower. Developing even smaller cylinders – 2 kg or even 1 kg – will further help. Expansion of direct household delivery of cylinders in rural areas, as already exists in urban areas, would also enhance usage.

[8] The identification of eligible families may also be done on the basis of appropriate indicators through the Socio Economic and Caste Census 2011 (http://secc.gov.in), if the BPL card is phased out in any state.

3. For BPL households, the level of subsidy is Rs. 50/kg.
4. For non-BPL households below the NLT a subsidy of Rs 25/kg (half the rate under the BPL) would keep the maximum cost at 8% of income for any Indian family, and much less for most.
5. If above the NLT, no subsidy would be available.

***Impact of smart subsidies programme***

What would the LPG subsidy in the nation look like once such a "smart subsidy" program was in place for a few years? The answer in detail would have to consider changes in income, population, household size, urbanization, oil price, and status of alternative fuels including electrification and piped natural gas, among other factors.

For illustration, however, using Table 1 and the Indian Energy Security Scenarios of the Planning Commission[9], that 70% of the 197 million rural households and 90% of 129 million urban households projected for 2027 were to use LPG, compared to 13% and 65% now, the total subsidy burden calculated is shown in Table 2 at about 46,000 crore, substantially less than what it would have been if the subsidy is provided to all LPG consumer as being done today[10], and with much more social benefit and a larger population. Put another way, the total national subsidy would drop from INR 560 to 320 per capita with much better targeting of the benefits. Of course, in reality, by that year incomes would likely have risen substantially for every group, reducing the subsidy required unless LPG prices rise even faster.

Instead of the richest half of the country receiving the subsidy as now, it would be targeted to the poorest 60% in rural areas and the poorest 40% in urban areas. No group would pay more than 8% of income on LPG in the entire country and no group in the bottom half of incomes would pay more than 5% -- most less. It would create a tremendous incentive to switch to this clean fuel for hundreds of millions of the poorest and most vulnerable groups, although of course with consequent challenges to create the infrastructure to do so.

[9] http://indiaenergy.gov.in/

[10] Total projected households using LPG = 254 million
Average subsidy rate for 2014-15 =Rs30 per Kg approx
Thus total subsidy burden = 25.4*7.9*12*30 = Rs.72237 Crore

Table 2 –

| Table 2 [alternative] | | | | | | | |
|---|---|---|---|---|---|---|---|
| Monthly Mean Household Expenditure (Rs.) | | Subsidy required to keep fuel expenditure below 5 percent for BPL families and 10 % for others (the BPL comes in 3rd decile for rural area and 2nd decile for urban area) | | Number of households with LPG in 2027 (assuming 70 % of rural households and 90 % of urban households will have LPG), millions | | Total Annual Subsidy Burden (crore rupees) | |
| Rural (household size 4.9 ) | Urban (Household size is 4.6) | Rural | Urban | Rural | Urban | Rural | Urban |
| 2909 | 3943 | 50 | 50 | 13.8 | 11.6 | 6562 | 5524 |
| 3838 | 5143 | 50 | 50 | 13.8 | 11.6 | 6562 | 5524 |
| 4432 | 6268 | 50 | 25 | 13.8 | 11.6 | 6562 | 2762 |
| 4987 | 7474 | 25 | 25 | 13.8 | 11.6 | 3281 | 2762 |
| 5566 | 8683 | 25 | NS | 13.8 | 11.6 | 3281 | 0 |
| 6204 | 10030 | 25 | NS | 13.8 | 11.6 | 3281 | 0 |
| 6991 | 11721 | NS | NS | 13.8 | 11.6 | 0 | 0 |
| 8062 | 14089 | NS | NS | 13.8 | 11.6 | 0 | 0 |
| 9837 | 17906 | NS | NS | 13.8 | 11.6 | 0 | 0 |
| 17242 | 38298 | NS | NS | 13.8 | 11.6 | 0 | 0 |
| | | | | | | | |
| | | Total Subsidy Burden | | | | 29527 | 16572 |
| | | Grand Total | | | | 46099 | |

NS – no subsidy* This is an indicated subsidy burden. Actual subsidy may differ depending on subsidy rate (BPL and non BPL) and market price of LPG.
** This example assumes a NLT of about Rs 80,000 in rural areas and Rs 1 lakh in urban areas, based simply on 12x monthly expenditure – designed to keep LPG expenditure less than 10% for any household

Having customers opt in to the subsidy scheme – and requiring certain conditions to be eligible – and then taking the subsidy amount that is saved and directing it to the more needy sections of society is a smarter way of distributing subsidies and ensuring large concomitant positive health and developmental impacts to this group. And this can be done such that the total subsidy bill to the GOI does not increase, and, indeed, decreases over time. One can also imagine that customers have to certify their eligibility every year so that as households grow richer and go above the cut-off level (or in the case of some urban areas, move to piped natural gas or electric induction cooking), the subsidy is redirected to the poor. And as the BPL households increase their income over time, their subsidies would reduce as well. The point here is that subsidies disappear as the population's income rises. In addition, by 2027 advances in national data collection systems may facilitate implementing smart subsidies even more.

In sum, while there has been much progress in the past decades in bringing clean cooking energy to the Indian populace facilitated by subsidies, the time has come to take the program to the next level and use smart subsidies to ensure the maximum possible development and health benefit for a given amount of subsidy.

Indeed, if the LPG expenditure of the government can be targeted to poor people more smartly, it should be termed social investment rather than subsidy, in keeping with other public investments in health and welfare, such as primary health care and schools. The national health and social benefits could also be immense.

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