Cooking with cleaner fuels in India: a strategic analysis and assessment

This "Policy Briefs Series" is the culmination of a joint research on healthy cooking fuel options for India, carried out by TERI and AIIMS during 2009–10 with funding support from UNICEF. The findings are based on extensive primary and secondary research that included literature reviews, interviews, focus groups, and field studies in select villages of Haryana state.

The first brief, *Indoor Air Pollution: A Case for Change* presents the health implications of indoor air pollutants derived from less cleaner cooking fuels. This brief, ***Cooking Fuels in India: Trends and Patterns*** tracks the usage and adoption of different fuels in rural and urban homes and also across select states in India. *Choices for Change: Evaluating Cooking Fuels* discusses the advantages and disadvantages of different cooking fuels and their suitability for certain user segments. In conclusion, *Call for Change: Catalysing a Cleaner Future*! invokes all stakeholders—the governments, funding agencies, industry, and consumer groups—to work in a concerted manner to accelerate adoption of cleaner cooking fuels and secure a cleaner and healthier home.

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POLICY BRIEF

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COOKING FUELS IN INDIA: TRENDS AND PATTERNS

India derives the bulk of its cooking energy needs from solid fuels, such as firewood and cattle dung. In contrast, economically developed countries, such as the USA, UK, Italy, Denmark, and others use cleaner cooking fuels.

India also displays a striking rural-urban dichotomy in its choice of cooking fuels (Figure 1). An overwhelming majority—about 80% of rural homes in India—continue to use biomass—firewood, crop residue or cow dung—as their primary cooking fuel[1]. This resource is available at almost no out-of-pocket cost—a factor that explains its high usage rate, even though firewood and cow dung are cumbersome to obtain and use. Notwithstanding the health hazards of the resultant smoke pollution, the '*free*' factor appears to override all other considerations. Many rural homes lack a closed kitchen and cooking is often done in an open area, which, to some extent, mitigates the impact of the smoking *chulha* (local parlance for 'cooking stove').

Urban India, on the other hand, opts for cleaner and convenient cooking fuels. Liquefied petroleum gas (LPG), marketed in portable cylinders lights the fire in over 59% of urban Indian kitchens. Many more are using cleaner fuel each year, thereby moving away from kerosene stoves and firewood or cow-dung-fuelled *chulhas*.

[1] International Institute for Population Sciences. 1992–93, NFHS: India

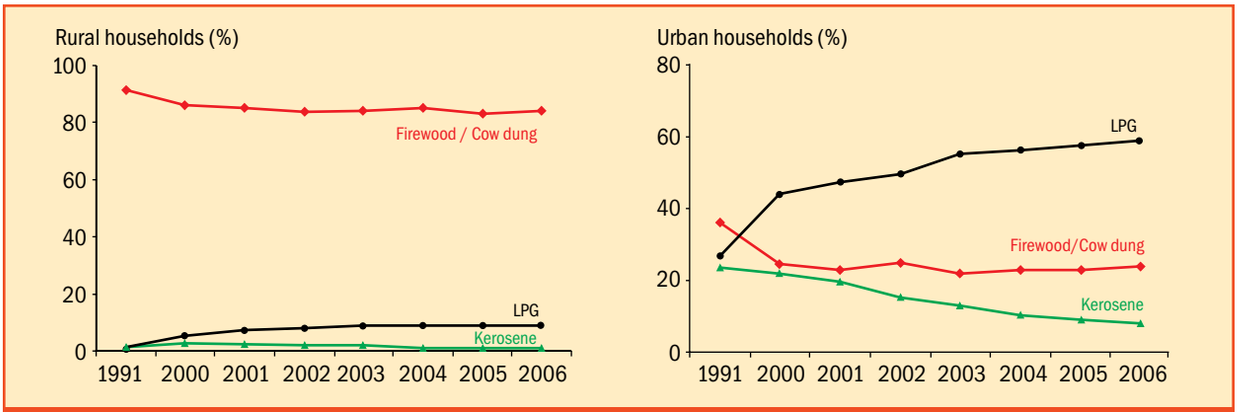


Figure 1 Fuel trends in rural and urban India
Reference NSSO (Data for coal and no cooking arrangement are not reflected)

Several factors further explain this urban rural dichotomy. Urban areas report higher per capita incomes, larger per capita household expenditures, higher average levels of education, and greater ecological consciousness. As a result, more urban homes opt for cleaner fuels like LPG or piped natural gas (PNG), in comparison to their rural counterparts.

Factors influencing consumer behaviour

Affordability appears as a major factor driving consumer choice. Data from households support this finding, as the monthly per capita consumption expenditure (MPCE) rises, so does the adoption of LPG in rural and urban homes (Figure 2). This also corresponds to a decline in traditional fuels, namely firewood and cow dung. However, the susbstitution of fuels is typically partial and rarely absolute.

Data suggests that in rural areas, a significant number of households, even in the higher expenditure category, still use firewood as their primary cooking fuel. In the top three expenditure percentiles, 50%–77% of households reported firewood as their primary fuel.[2] This behaviour suggests that affordability is not the sole determinant and other factors, such as tradition, lure of free fuel, education, and ecological awareness are strong influences.

Yet, we strongly believe that among the higher income groups of rural population lies the consumer

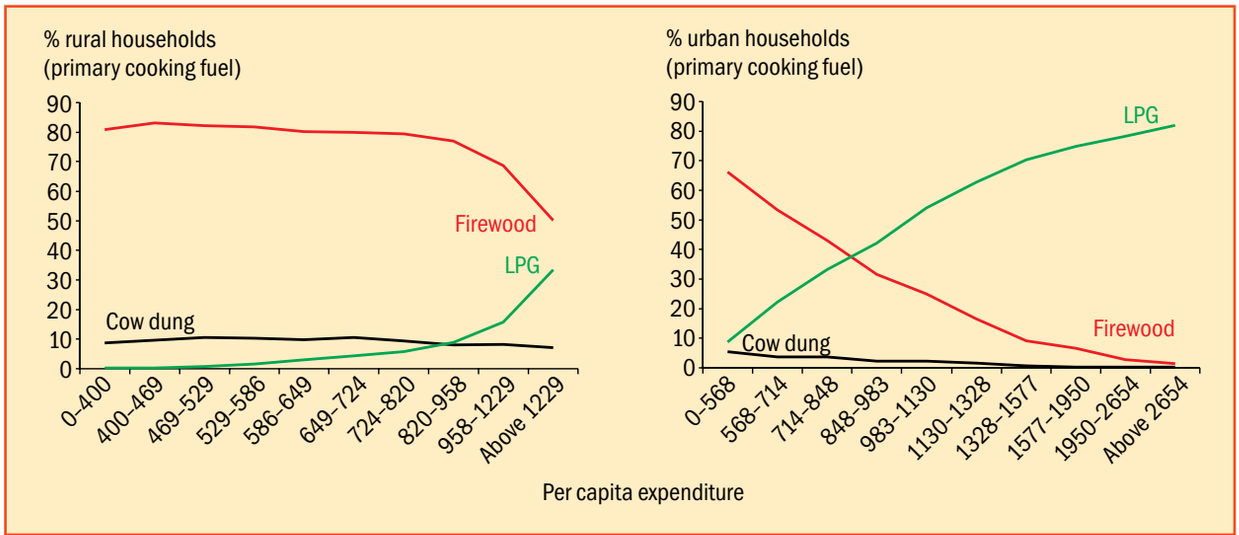


Figure 2 Fuel preferences in rural and urban India

[2] NSSO 61st Round (2004–05)

group that can be early adopters of LPG as primary fuel, thereby serving as change agents for others, and catalysing the climb towards cleaner fuels placed in the upper rungs of the energy ladder.

The influence of factors other than affordability is also reflected in the data carried in NSSO 63rd Round (July 2006 and 2007). It revealed that 75% of rural households reported firewood as their primary cooking fuel, and had an average MPCE level of ₹647. On the other hand, only 22% of urban households reported using firewood as their primary cooking fuel, and had an average MPCE level of ₹691. This shows that despite the proximity of MPCE levels in the two settings, use of firewood varies drastically. It is apparent that additional factors, such as awareness, ease of availability, cooking space constraints, social customs, and demographics (for example, working women) play a significant role in the choice of fuel in urban locales.

Pattern of cooking fuel across states

Indian states show variation in the mix of fuels used for cooking. Not unexpectedly, states with higher per capita income generally tend to have higher proportion of families opting for convenient and cleaner fuels. A case in point is Punjab, an economically prosperous state with per capita income of ₹50, 558 (2008–09)[3] that predictably has a lower usage of traditional fuels in rural homes (65% of the fuel used comes from biomass-based sources) than Bihar (83% of the fuel used comes from biomass-based sources), which has a per capita income of ₹9,586 (2008–09).

We also mapped the fuel mix of states against their index of infrastructure. The Government of India's (GoI's) Eleventh Finance Commission had constructed this index based on economic, social, and administrative infrastructure indicators like agriculture, banking, electricity, transport, communications, health, and civil administration. Figure 3 reveals that states, which rate high on the index of infrastructure also show greater use of LPG and relatively lower reliance on traditional biomass fuels. This trend again supports the notion that the choice of fuels is driven by a combination of factors, such as *affordability*, *acceptability*, *availability*, and *awareness*, all of which are indirectly reflected in the composite index of infrastructure.

Conclusions

Rural India has traditionally been reliant on biomass-based fuels, such as firewood and cow dung, while urban India is riding the growth of LPG and PNG.

Although rural and urban India show a division in their current use of cooking fuels, they are not united in their move towards cleaner

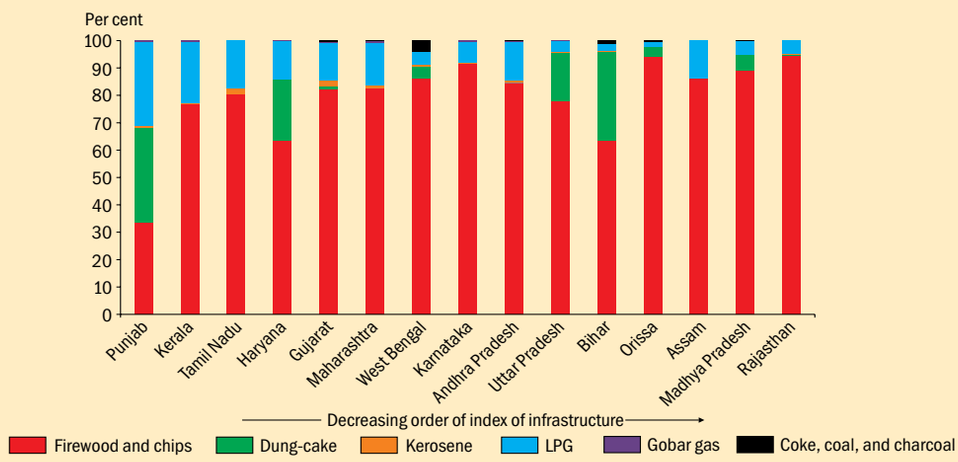
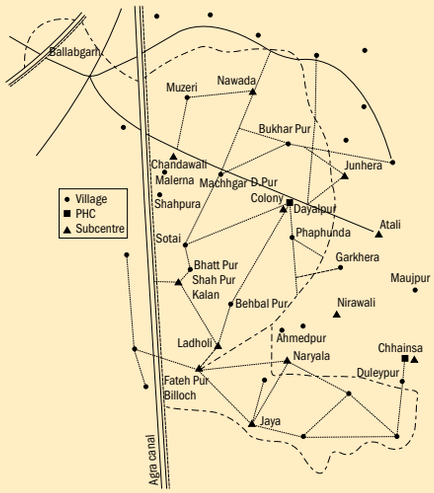


Figure 3 Percentage of rural households across states using different fuel types for cooking
Source NSSO 63rd round (2006–07)

[3] http://mospi.nic.in/rept%20_%20pubn/ftest.asp?rept_id=nad03_1999_2000&type=NSSO_

Voices from the villages

A TERI research team visited three villages—Dayalpur, Chandawali, and Maujpur in Haryana—to get a first hand understanding of how families in a rural setting were managing their cooking fuel mix and to gather their opinions and perspectives from a user's point of view. The team conducted surveys and multiple focus group discussions attended by women, men, young girls, and village elders. Some of the major findings from these community interactions are consolidated as follows.



- The villagers were primarily engaged in agricultural work and 80% lived in pucca houses. Farm land was held by a small percentage of families. The most common cooking fuel was crop residue and cow dung and a mere 11% of the households had LPG. These trends closely mimicked the national level data as per the NSSO. Villagers had no knowledge of improved cook stoves and the biogas plant had been adopted by only a few households. The other modern gadgets were popular—80% of households owned bicycles, 30% had two-wheelers with 6% having cars, 70% owned mobile phones and refrigerators.
- Despite the ubiquitous chulha, most people acknowledged that smoke was harmful and exposure to smoke was harmful for all ages.
- Not surprisingly, the older generation preferred the traditional cook stove as they were habituated to the flavour, texture, and taste; though the young girls of Dayalpur village aspired for the more convenient modern fuels. The younger generation expressed that cooking with LPG or PNG would enhance their image amongst peers.
- Incidentally, PNG networks are being laid out in this village. Villagers expected that PNG supply would be hassle free and dependable once provided and looked forward to getting connected.
- Dayalpur, the most prosperous village had a large, land-owning Jat community, primarily using modern fuels. Maujpur was farthest away from pucca roads and was the least developed with minimal infrastructure. People were unaware of newer technologies and alternatives like improved stoves and biogas.
- The study team learnt that the closest LPG distributor for cylinder carry-out was 5 to 10 km away in Ballabgarh. Since the villagers do not have access to home delivery systems, getting cylinders ends up as an arduous task, adding half a day of work on a bicycle or auto-rickshaw. Reaching the town did not assure a cylinder, as the distributor based in the town often complained of erratic LPG supply.
- Several households had LPG connection, but used it primarily for quick jobs, such as preparing tea for guests.

'We do not have a fixed schedule and have very little time to gather wood, so we use kerosene.'
...remarked a migrant construction worker, in Dayalpur.

'Village elders like the taste of roti made on traditional chulha.'
...stated a young girl from Chandawali.

'Poor supply of LPG prompted us to try biogas'
.. explained a biogas user.

Thus, myriad of factors, including tradition, habits, cost, supply, convenience, critical awareness, and access to schemes and programmes influence the cooking fuel practice.

cooking fuels. What stands in the way of a sweeping migration towards cleaner fuels are factors of *affordability*, *availability*, *awareness*, and to some extent, *acceptability*.

All stakeholders—governments, industry, and social activists—must work collectively and concertedly to alleviate some of these barriers. The availablity of LPG and PNG in villages has to be improved in the long run. In the short run, technologies that harness the use of affordable fuels like biomass in a high-efficiency, low-emission mode, must be promoted. And then, there will be fire, but no smoke in the Indian kitchens!

What stands in the way of a sweeping migration towards cleaner fuels are factors of affordability, availability, awareness, and to a lesser extent, acceptability.