



Gender and Fossil Fuel Subsidy Reform in India:

Findings and recommendations

GSi REPORT

Global Subsidies Initiative-IISD and Integrated Research and Action for Development (IRADe)

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Executive Summary

The report examines from a gender perspective the impact of subsidies and reform to cooking gas in India. The research was based around two overall research questions namely “How do existing liquified petroleum gas (LPG) subsidy policies affect the welfare, productivity and empowerment of women and girls in low-income households?” and “How might this change given a change in subsidy policy or mitigation measures?” These questions were explored using secondary data, household surveys (covering 810 households) and focus group discussions (FGDs). The questions were answered within the context of hypotheses made during the scoping phase and literature review for the research. This research attempted to answer the above questions in relation to income, energy use and energy supply effects, from a gender perspective. The report is part of a broader project that also examined gender and fossil fuel subsidies in Bangladesh, Indonesia and Nigeria.

There is a push within the United Nations Sustainable Development Goals to “leave no one behind.” This research found that India’s schemes to promote clean cooking are improving energy access for poor women. However, around half of the women surveyed *are* being left behind because they are not using LPG and continue to cook with biomass.

India has two large subsidies for clean cooking that are linked to LPG. The *Pratyaksh Hanstantrit Labh* (PAHAL; formerly known as the Direct Benefits Transfer scheme or DBTL) provides ongoing “consumption” subsidies for LPG refills for registered beneficiaries, which includes the majority of all consumers. Introduced in 2016, the *Pradhan Mantri Ujjwala Yojana* (PMUY) scheme aims to subsidize the upfront costs of switching to LPG (a “connection” subsidy). PMUY targets poor women, who receive the subsidy via their bank account.

Women were found to be the primary cooks, and those women who have accessed the LPG subsidies have likely benefited from reduced exposure to harmful indoor air pollution, time savings and reduced drudgery. Women saved on average about one hour per day due to reduced cooking and cleaning times when cooking with LPG rather than biomass. However, LPG collection from distant depots may create a new time burden for men in rural areas, given they were found to be primarily responsible for this task.

Our survey found that in 74 per cent of households surveyed, women made the decisions on cooking energy sources. Since the PMUY scheme targets only female beneficiaries, it is reasonable to infer that the scheme has placed more decision-making power in the hands of women. At the same time, aligning policies for cooking fuels with gender could reinforce existing gender roles.

Current LPG subsidies were found to be inefficient and untargeted. Among surveyed households, only 48 per cent of PMUY beneficiaries were among the poorest 40 per cent of households. And more than half of poor households surveyed in the states of Chhattisgarh and Jharkhand did not use LPG and therefore did not benefit from PMUY. Failure to take up LPG may be due to three reasons: the cost of LPG connections or cylinder refills are still too high for some households; LPG is not locally available; or poor households may be ineligible for the subsidies. PMUY is based on targeting through data from the SECC-2011, which several experts consider might be unreliable or incomplete, with many errors. In terms of affordability, the PMUY does not provide a stove or first refill but instead allows LPG distributors to offer a loan for these, which is repaid through higher subsequent LPG prices. There have been reports of subsidy recipients needing to pay bribes to get their “free” connection. Efforts by oil marketing companies to increase LPG distribution in remote areas have improved LPG access in recent years, but distances remain prohibitive for some households.

The significant inefficiency in PAHAL (DBT) targeting is striking, with subsidies in 2018 estimated at INR 2,008 billion (USD 31.15 billion)¹, more than eight times the volume allocated to the PMUY, estimated at INR

¹ This report has sourced exchange rates from the Reserve Bank of India; 1USD is INR 60.4 in FY14, INR 61.1 in FY15, INR 65.4 in FY 16, INR 67 in FY17 and INR 64.4 in FY18; <https://www.rbi.org.in/scripts/ReferenceRateArchive.aspx>



24,960 million (USD 0.4 billion). A large share of high-income households benefit from the PAHAL (DBTL) consumption subsidy: among the LPG-using households surveyed, 48 per cent did not hold below the poverty line (BPL) cards.

Recommendations for the Government of India are:

- **Improve targeting of LPG subsidies** so that relatively wealthy households receiving the PAHAL (DBTL) are excluded from access, and funds are directed to connection subsidies for those currently dependent on biomass.
- **Review subsidies to ensure the poorest can afford a new connection.** The policy of not providing a free stove or first refill undermines the scheme's energy access goals, decreasing affordability for the poorest.
- **Take care when reforming LPG price subsidies not to disadvantage the poor.** When asked to imagine a scenario where LPG prices increased by 40–50 per cent, 14 per cent of households using LPG said they would revert to cooking with biomass.
- **Improve education, distribution and alternative clean cooking options.** Non-price factors such as education play an important role in the choice of cooking fuel, as does availability of LPG and alternatives. India's commitment to promoting LPG has been successful to an extent but there may be other technologies more suitable for rural areas, such as biogas or solar, or induction electric cooking in urban areas. India's draft National Energy Plan recognizes the need for a National Cooking Mission to address clean cooking more holistically.
- **Target subsidies away from fuels and toward outcomes.** This would likely imply shifting to cash transfers based on gender empowerment outcomes. In terms of energy, this could imply better targeting technology-neutral subsidies to households and women who need them most.

India is a “high-impact” country in that the total number of people without access to electricity or clean cooking is among the highest in the world. Like many countries, India is reviewing energy subsidies, undergoing reforms and increasing prices but also has goals to increase energy access and women's empowerment. These reforms present an opportunity for policy-makers to deliver and target policies that cluster gender and energy access benefits toward poor, often rural, women and ensure that no one is left behind.



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Glossary

Clean cookstoves	The Global Alliance for Clean Cookstoves (n.d.) rates cookstoves as clean if they meet minimum standards on efficiency, indoor emissions, total emissions and safety.
Consumption subsidy	A consumption subsidy is a transfer that covers some or all of the cost of a product when it is consumed.
Connection subsidy	A connection subsidy is a transfer that covers some or all of the cost associated with using a product for the first time. For LPG in India, this includes a 14.2 kg cylinder, regulator, hose pipe and administrative charges.
Empowerment	Empowerment is defined as “the process through which people take control and action in order to overcome obstacles of structural inequality which have previously put them in a disadvantaged position” (ENERGIA, 2012, p. 4).
Energy sector reform	Structural changes in the policies and institutions that govern any part—production, transmission or distribution—of the energy value chain, and any fuel within this value chain.
Fossil fuel consumer subsidy	A fossil fuel consumer subsidy is a policy that reduces the retail price of fossil-derived energy by shifting part of the cost burden onto other actors in the economy. Most often, the cost burden is shifted onto the public budget, where taxpayer money or foregone tax revenue is used to keep energy prices low. But costs can be shifted in other ways too: for example, by requiring energy distributors to operate at a loss. The economic cost of energy includes opportunity costs, so it is still a consumer subsidy if countries provide domestically produced energy at prices below the international market level. Fossil fuel subsidies do not truly reduce the cost of energy for a country; they simply alter who pays and how.
Gender	Gender “refers to the socially-constructed attitudes, values, roles and responsibilities of women and men, in a given culture and location. These attitudes, values and roles are influenced by perceptions and expectations arising from cultural, political, economic, social and religious factors, as well as from custom, law, class, ethnicity and individual or institutional bias. Gender attitudes and behaviours are learnt and change over time” (ENERGIA, 2012, p. 4). As a social construct, gender is often defined in contrast with sex, which refers to the assignation of “male” or “female” to a body based on the identification of physical, biological differences.
Gender equality	Gender equality is a state where “there is no discrimination on grounds of a person’s sex in the allocation of resources or benefits, or in the access to services. Equality exists when both men and women are attributed equal social value, equal rights and equal responsibilities, and have equal access to the means (resources, opportunities) to exercise them. Gender equality may be measured in terms of whether there is equality of opportunity, or equality of results” (ENERGIA, 2012, p. 5).
Gender equity	Gender equity refers to “fairness and justice in the distribution of benefits and responsibilities. Gender equity is the process of being fair to women and men. To ensure fairness, measures must often be available to compensate for historical and social disadvantages that prevent men and women from otherwise operating on a level playing field. Equity leads to equality” (ENERGIA, 2012, p. 5).

**Modern energy access**

There is no universally accepted definition of modern energy access. Sustainable Energy for All (2013) states that there is growing consensus that “access” should not be defined as a binary state (access or no access) but as a continuum of improvement against a number of metrics. The scoping paper (Kitson et al. 2016), prior to this research, defines modern energy access as the supply of fuels and combustion technologies that are reliable, convenient and do not cause indoor air pollution, as well as the increased rate of consumption of such fuels and combustion technologies. By this definition, improving modern energy access might include expanding the supply and increasing the consumption of electricity among households, as well as liquefied petroleum gas, clean cooking fuels, clean cooking stoves, advanced biomass cookstoves and biogas systems.

Non-solid fuel

Non-solid fuels include liquid fuels like kerosene, ethanol and biodiesel, and gaseous fuels like LPG, natural gas and biogas. This is in contrast to solid fuels like wood, charcoal, agricultural residue, dung and coal.



Abbreviations

APL	above poverty line
BIDS	Bangladesh Institute of Development Studies
BPL	below poverty line
DBTL	Direct Benefits Transfer for LPG now known as PAHAL
EMI	Equated Monthly Installment
FGD	Focus Group Discussion
GDP	gross domestic product
GSi	Global Subsidies Initiative
IEA	International Energy Agency
INR	Indian rupee
IRADe	Integrated Research and Action for Development
LPG	liquefied petroleum gas
LSI	Lembaga Survei Indonesia
MJ	megajoules
NFHS	National Family Health Survey
NSSO	National Sample Survey Organisation
OMCs	Oil Marketing Companies
PAHAL	<i>Pratyaksh Hanstantrit Labh</i> (benefits transfer program for LPG)
PMUY	<i>Pradhan Mantri Ujjwala Yojana</i> (targeted LPG connection subsidy)
PPAC	Petroleum Planning and Analysis Cell database
SECC	Socio Economic Caste Census
S4C	Spaces for Change
SHS	solar home system
USD	United States dollar



1.0 Introduction

Analysis of energy subsidies rarely considers effects of policies depending upon the gender of the consumer (Kitson, Merrill, Beaton, & Sharma, 2016). Instead, attention has focused on identifying the size and nature of fossil fuel subsidies, assessing performance with respect to aspects of social welfare (e.g., del Granado, Coady, & Gillingham, 2012; Coady, Flamini, & Sears, 2015), price control and supply (e.g., Adeoti, Chete, Beaton, & Clarke, 2016), and their environmental impact (e.g., Gerasimchuk, et al., 2017, Jewell, et al., 2018; Merrill, Bassi, Bridle, & Christensen, 2015). A further body of research considers the effects of reforming subsidies, particularly on poorer consumers, and measures to protect these consumers (e.g., ADB, 2016; Cameron, et al. 2016; Beaton, et al., 2013).

Broadly speaking, this literature points to three main effects of subsidies and reform (Kitson et al., 2016): an “income effect,” where the subsidies represent an effective transfer to household incomes due to lower fuel prices; an “energy use effect,” where the subsidies may influence the type or quantity of fuel that is used by the household; and an “energy supply effect,” where the subsidy changes the availability of an energy source. Each of these effects may have specific consequences for women, as described in Figure 1. However, to date, there has been no empirical work exploring or quantifying these potential effects. The research described here is a first attempt to address this gap, focusing on the income and energy use effects of subsidies and subsidy reform.

This report focuses on India as a country with gender inequality gaps, fossil fuel subsidies and energy access issues. According to the Gender Gap Index of 144 countries (where one has the smallest gap and 144 the largest), India ranks 108 (World Economic Forum, 2017). Access to modern energy, as estimated by available metrics, is limited (see Table 1). The study is part of a broader project that also examined gender and fossil fuel subsidies in Bangladesh, Indonesia, and Nigeria (Box 1).

Table 1. Fossil fuel subsidies (total, per household) and population without access to modern energy, 2016

Total fossil fuel subsidies (2014) (million USD)	Total subsidies per cent GDP (2013)	Subsidies per household (USD)	Population without access to electricity (million; percentage of population)	Population without access to clean cooking (million; percentage of population)
13,352 (35,860)	0.6 (2.5)	48	270 (15%)	781 (59%)

Sources: World Bank, 2018a; IEA, 2014; IEA, 2018; United Nations Department of Economic and Social Affairs, 2017; World Bank, 2018b; authors' calculations.



Box 1 Multi-Country Study Summary

When this study commenced, Bangladesh, India and Nigeria were the countries with the largest numbers of people globally without access to electricity (in 2016): India (15 per cent of population, 270 million), Nigeria (41 per cent, 76 million) and Bangladesh (24 per cent, 39.2 million) (World Bank, 2018). With China, they also have the largest populations without access to clean cooking (India: 781 million, China: 572 million, Nigeria: 177 million, and Bangladesh: 134 million).

All three countries have gender inequality gaps and fossil fuel subsidies. Bangladesh and Nigeria rank 47 and 122 on the Gender Gap Index, respectively. In Bangladesh and Nigeria, the focus of the study was on subsidized kerosene. Kerosene is used for lighting in Bangladesh and for both cooking and lighting in Nigeria.

A coordinated multi-country study was undertaken by in-country researchers and an international team. The methodology was similar across countries and results were analyzed for country-specific and cross-country findings. A summary of the cross-country findings and recommendations is provided at the end of this report, but readers are encouraged to view the multi-country report for full details (Global Subsidies Initiative-IISD, BIDS, IRADe and Spaces for Change, 2019).

As part of this research an audit of secondary data was undertaken in 2017 regarding LPG subsidies in Indonesia from a gender perspective, with findings published in Kusumawardhani et al. (2017). Indonesia is highly relevant because it has implemented a kerosene to LPG conversion program for cooking since 2007. However, most of the LPG subsidy benefits accrue to the wealthy (Lembaga Survei Indonesia [LSI], 2014). Due to rising costs, the government is considering ways to better target the subsidy, which have been politically difficult to implement. Any potential reforms to LPG subsidies would be likely to target the subsidy to the poor or replace the subsidy with a social assistance cash transfer program.

The research was informed by a review (Kitson et al., 2016) of the literature on India as well as Bangladesh and Nigeria. The research also reviewed 28 reform episodes from across the world from a gender perspective, finding that 18 relied on targeted mitigation measures, including expansion of public works, education and health programs in poor areas. Gender-sensitive policy-making can consider the extent to which such policies can be designed to compensate for inequalities in intra-household decision making. This might include the use of universal or conditional cash transfers, structured to be more likely to increase the power of women in determining household expenditure decisions. Alternatively, policies might include social assistance measures intended to meet women's essential needs, such as health care, or to enable their participation in the labour market, such as infrastructure programs or microloans targeted at women.

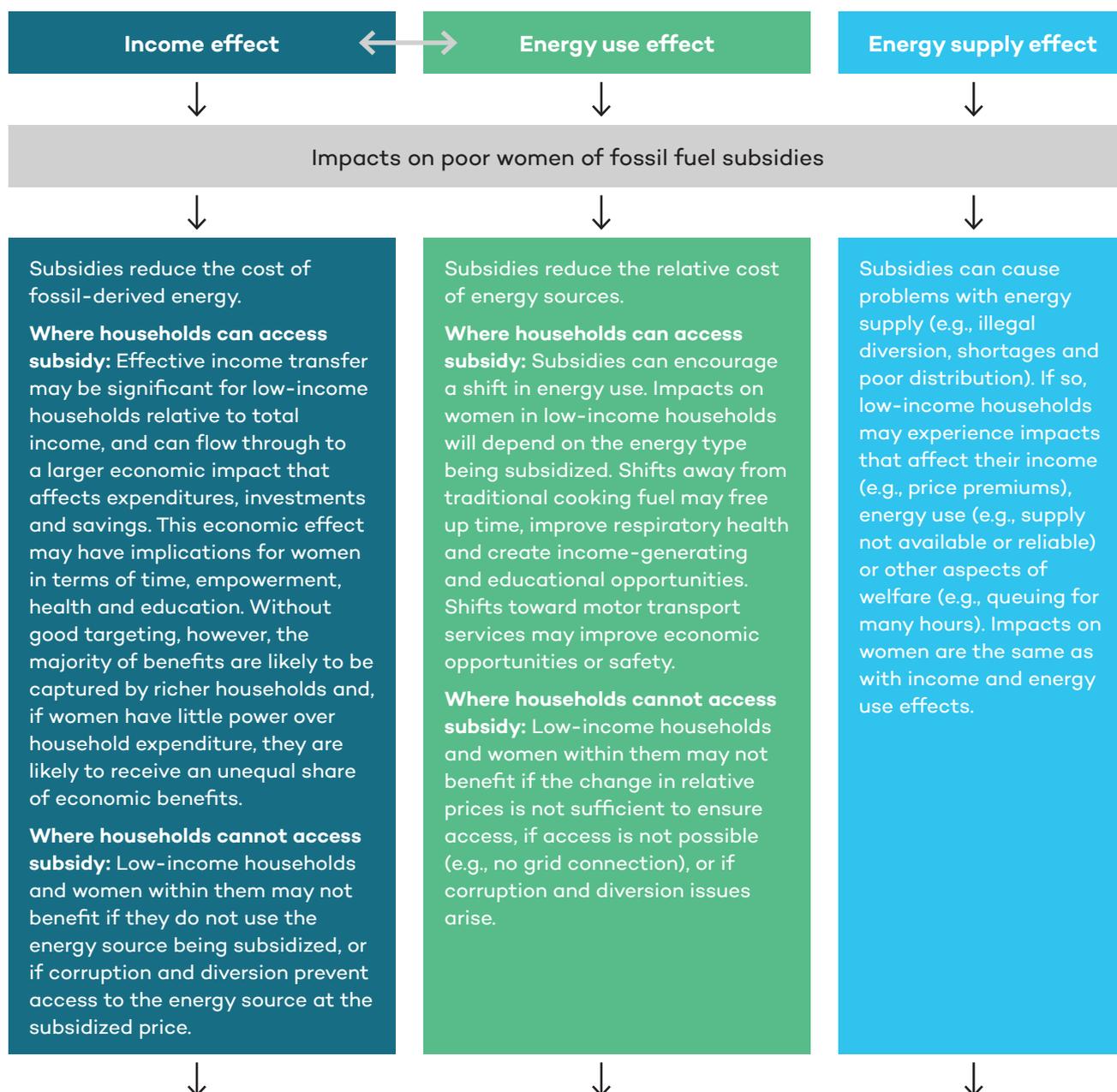
Overall, the literature review (Kitson et al., 2016) also found that there is a substantial body of knowledge examining the range of measures that can address the adverse impacts of increased energy prices resulting from subsidy reform. This knowledge is drawn from analysis of previous reform attempts, as well as more theoretical analyses. However, to date, few of the measures implemented or discussed with respect to fuel subsidy reform consider how to address the specific effects on men and women. As with fuel subsidy policies themselves, reform policies are rarely gender-specific and can thus have unintended impacts on gender equality. If the government objective is to promote gender equality, reforms should be designed and implemented so as to not only counteract potentially negative effects upon women, but also to maximize opportunities for improving women's lives.

The literature review further revealed that the impacts of energy subsidies, the impacts of energy sector reform, and workable or appropriate mitigation measures associated with any reforms are extremely context-specific. Nonetheless, strong evidence indicates that in many countries a significant proportion of subsidy benefits are captured by well-off households, suggesting a general phenomenon of energy subsidy inefficiency if the desired policy objective is to target income and energy access benefits to women and men living in poverty.



Based on the literature review, primary research was conducted in India with local partners. The research focused around two main research questions: “How do existing LPG subsidy policies affect the welfare, productivity and empowerment of women and girls in low-income households?” and “How might the welfare, productivity and empowerment of women and girls in low-income households change as a result of specific, nationally relevant proposals for the reform of existing LPG subsidies?” Similar questions were addressed in Bangladesh and Nigeria.

Figure 1 describes the hypothesis as set out based on the literature review. This is followed by a chapter describing the research methodology, followed by the country-specific results for India. The final chapter presents findings for India as well as a summary of overall findings across the three countries.



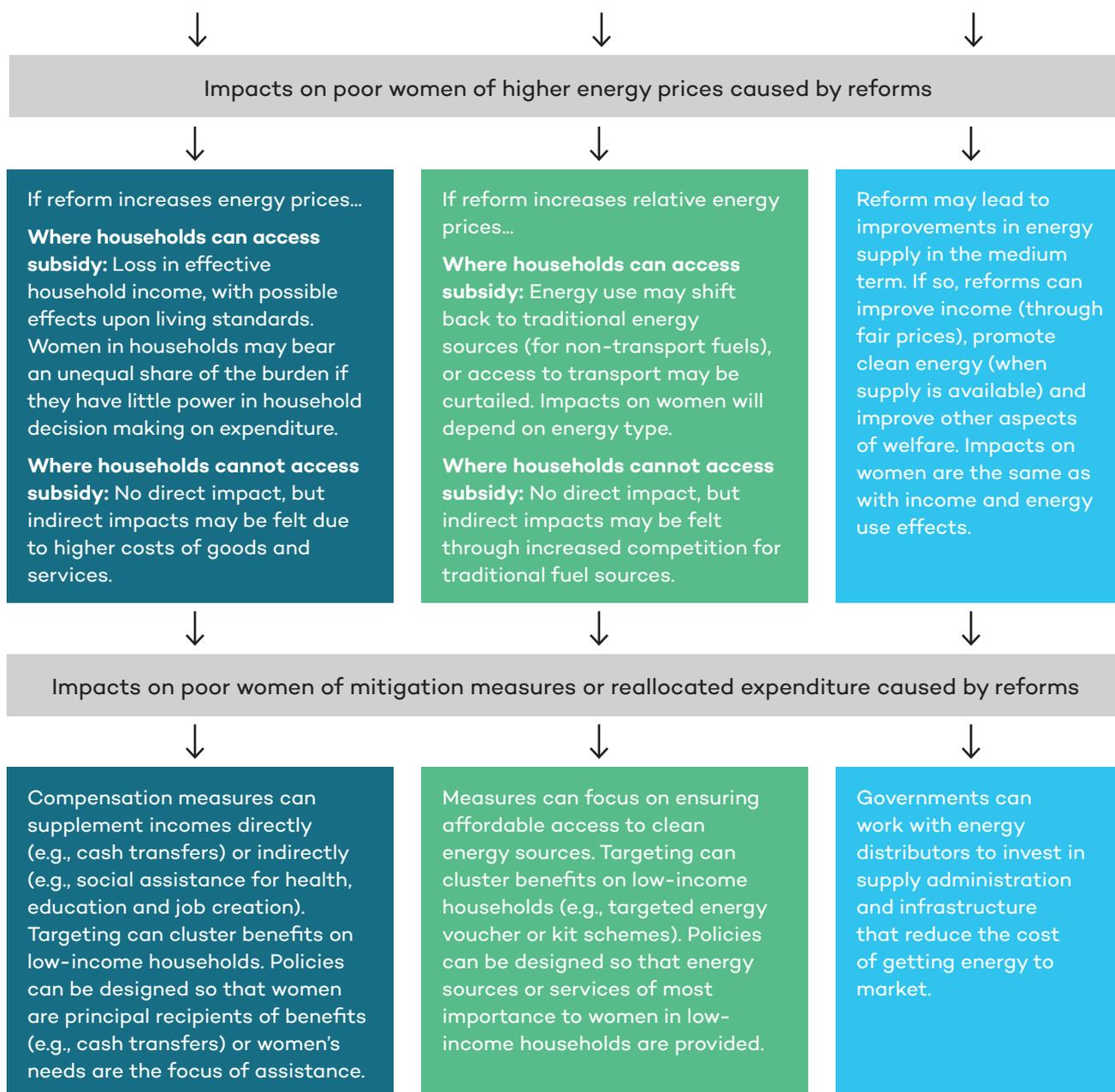


Figure 1. Likely impacts of subsidies, their reform and mitigation measures on women

Source: Kitson et al., 2016.



2.0 Methodology

On the basis of the literature review, two overarching research questions were established. The first sought to clarify the extent to which existing subsidies for cooking and/or lighting fuel in each country have distinct gender-disaggregated effects on the welfare, productivity and empowerment of poor women and girls. The second sought to clarify how specific, nationally relevant reforms might have further gender-disaggregated impacts on poor women and girls, including the provision of alternatives to fossil fuel subsidies.

This two-stage approach reflected the facts that: a) the literature review found a paucity of research on the impacts of subsidies themselves on gender; and b) the policy agenda in many countries is focused on the reform of fossil fuel subsidies, such as the phasing out of kerosene, as well as policies to support decentralized renewable energy generation.

In India, policy changes were introduced during the lifetime of the research project: the introduction of a connection subsidy (PMUY) in 2016, some efforts to improving the targeting of existing subsidies and a series of staged price increases. The full research questions are outlined below.

Table 2. Overall research questions and specific to India

Overall research questions	
<p>1. How do existing kerosene and LPG subsidy policies affect the welfare, productivity and empowerment of women and girls in low-income households, taking into account:</p> <ul style="list-style-type: none"> • Impacts of the subsidy on kerosene and LPG distribution? • The extent to which the subsidized price is actually reflected in kerosene and LPG retail prices paid by consumers? • The extent to which lower kerosene and LPG retail prices influence household fuel use? 	<p>How might the welfare, productivity and empowerment of women in low-income households be impacted through changes in subsidy policies and mitigation measures?</p>
India-specific research questions	
<p>How do existing LPG subsidy policies affect the welfare, productivity and empowerment of women and girls in urban and rural low-income households in two districts—Ranchi (in the state of Jharkhand) and Raipur (in the state of Chhattisgarh) taking into account:</p> <ul style="list-style-type: none"> • Impacts of the subsidy on LPG distribution? • The extent to which the subsidized price is actually reflected in LPG prices paid by consumers? • The extent to which lower LPG retail prices influence household fuel use? 	<p>How might the welfare, productivity and empowerment of women in low-income households change as a result of the following policy reforms:</p> <ul style="list-style-type: none"> • Strengthening the existing LPG distribution network • Equated monthly installment (EMI) facility for availing LPG official connection

Research was based on a combination of primary and secondary data. Primary data were collected through household surveys, focus group discussions (FGDs) and personal interviews. The study employed a multi-stage stratified random sampling design for identification of households for primary data collection. Indian Census villages in the rural area and wards in urban areas are considered to be the primary sampling units. The ultimate stage units are the households in both the areas.



A total of 810 sample households were surveyed—300 from Ranchi and 510 from Raipur including both rural and urban sample households. The surveys had nearly 40 questions with sub-sections, and on average took 60 minutes to complete. Surveys were conducted in April and May 2017 in two states, Jharkhand and Chhattisgarh, two states with high levels of poverty and the lowest rates of access to clean cooking. In 2011–12, a National Sample Survey Organisation (NSSO) study found that the use of LPG as a primary cooking fuel was lowest in Chhattisgarh, where only 9.5 per cent of the state’s households used LPG primarily for cooking,² followed by Jharkhand at 13.5 per cent (NSSO, 2015). The average rate of usage of LPG as a primary cooking fuel across the total population of both states was 11.8 per cent.

The districts of Ranchi from Jharkhand and Raipur from Chhattisgarh were selected as they represented a balanced mix of rural and urban population (Raipur is 36 per cent urban and 64 per cent rural; Ranchi is 43 per cent urban and 57 per cent rural). This is useful to understand the major cooking fuel issues in both rural and urban areas. Where possible, the female head of household was sought as the interviewee.

The main sources of secondary data used in the analysis are major national statistical databases that contain information on energy use and gender, as well as some published studies that shed light on specific aspects of the research framework, namely:

- District-Level Health Survey
- National Family Health Survey (NFHS)
- Household consumption expenditure survey
- Employment and unemployment survey
- Petroleum Planning and Analysis Cell (PPAC) database
- Census 2011, Government of India

A similar approach was used in Bangladesh and Nigeria (Box 2).

Box 2. Multi-country methodology

Household surveys focused on selected regions in each country. A common questionnaire structure was developed, piloted and adapted to suit national circumstances. In total, 2,400 surveys were conducted across the three countries. Each country (Bangladesh, India and Nigeria) was analyzed independently before attempting to conduct a comparative analysis, so that perspectives deriving from each individual case would inform the larger whole. Conducted jointly by all partners in the consortium, the analysis is based on interpretation of descriptive primary and secondary quantitative data within the broader context of qualitative analysis of other literature and qualitative data. The comparison between countries is qualitative in nature.

² A primary source of cooking implies the fuel that is the main source of cooking in the last 30 days preceding the survey date (NSSO, 2015).



3.0 Background

As of 2015, around 780 million people in India were estimated to primarily rely on traditional forms of cooking fuel (IEA, 2017), in combination with other energy sources. India's biggest policy for addressing clean cooking has been to provide subsidies for LPG, a clean-burning gas that is derived by refining crude oil or "wet" natural gas, and sold in pressurized cylinders. The table below quantifies the national government's expenditure on LPG subsidies, which is the single largest petroleum product subsidy in India.

Table 3. India's LPG subsidies (INR million)

Subsidy	FY14	FY15	FY16	FY17	FY 18
Under Recovery on Domestic LPG	464,578	365,802	184	NIP	NIP
Excise Duty Exemption on Domestic LPG	405,571	370,258	50,456	58,442	NIP
PAHAL (DBTL)	38,693	39,709	218,110	129,050	208,800
Fiscal Subsidy on LPG	19,040	22,720	NIP	NIP	NIP
Lower GST rates for Domestic LPG	NIP	NIP	NIP	NIP	139,649
PMUY	NIP	NIP	NIP	29,990	24,960
Permanent Cash Advance pertaining to DBTL	12,340	NA	57,550	NA	NA
OMC support for LPG connections for poor households	391	2,248	7,915	NA	NA
Other*	592	170	2,000		250
Total	576,191	467,674	336,215	217,482	373,659
(USD million)	(9,524)	(7,648)	(5,136)	(3,242)	(5,798)

Notes: NA = not available, NIP = Not in Place, NC = Not Calculated

* Other 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.)

Women are predominantly responsible for cooking in India, and any fuel used for cooking has a disproportionate effect on women and their health. In our sample of 810 households, only five households said a male was primarily responsible for cooking. However, males also cooked: 521 households reporting that a male had cooked at least one meal in the last 30 days.

Fuel collection, purchase and preparation also tends to be gendered, with women being typically responsible for biomass collection and preparation across most of the country, while men tend to bear more responsibility for energy purchases (CSO, 1998). An examination of LPG subsidies as part of a clean cooking transition therefore deserves a gender-disaggregated approach.

As of 2018, India provides subsidies to support LPG take-up and consumption. Its support for LPG has been a highly dynamic area of policy-making over the past decade, with many significant policy reforms. A review of policy developments can be found at GSI (2018). Major policies are administered by the national government, but many state governments also provide additional assistance to households on initial LPG take-up.



Subsidized LPG is sold in India by the government's three oil marketing companies (OMCs) through a national network of distributors in the form of 14.2 kg cylinders. To access subsidized LPG, households must obtain an LPG “connection”³—that is, enroll themselves with any one OMC's registry of beneficiaries and obtain the necessary equipment (a stove, cylinder, regulator and hose). Households can apply for a connection for a single cylinder (14.2 kg) or a double cylinder. Connection comes at a significant cost, including charges for a security deposit and the cost of equipment.

This study examines changes in India's LPG policies that have taken place since 2014. In 2014, India provided subsidies for LPG consumption but not for the costs of an LPG connection. Consumption subsidies had been provided for many years, but as of 2014 had begun to be administered through a cash transfer mechanism called the Direct Benefits Transfer mechanism for LPG or “DBTL,” which is still in place today, under the name PAHAL (DBTL). Under this scheme, households purchase LPG cylinders at market price and the subsidy amount⁴ is credited directly to customers' bank accounts to reduce the net price of the LPG cylinder. Customer authentication also requires some form of personal identification, registered to the same household member. A mobile phone can be linked to the registration to facilitate payment, but it must also be linked to the same household member.

In 2014, this mechanism was universal: that is, all households, including the rich, were eligible for the LPG subsidy. Nonetheless, not all consumers benefited equally. The PAHAL (DBTL) system of transfers with authentication had been introduced to reduce illegal connections and diversion, and it succeeded in significantly reducing the number of registered beneficiaries—but some of the savings were due to households being unable to qualify under the new criteria for registering, and there was no clear national data on the scale of this problem (GSI, 2018). High upfront costs of connection were another major barrier to access among poor households. A survey of six Indian states in 2015 found that 95 per cent of households without an LPG connection cited “high connection cost” as a reason for not using LPG—though 88 per cent also cited “high monthly expenses,” despite the existence of the PAHAL (DBTL) consumption subsidies (Jain et al., 2015). The same survey in 2018 found similar results, with 92 per cent citing high connection cost and 87 per cent citing high monthly expenses (Jain et al. 2018).

In 2016, an attempt to improve access for the poor began with the introduction of the *PMUY*. This earmarked INR 80 billion (USD 1.2 billion) to provide 50 million LPG connections to poor households by 2019. The policy explicitly targeted “the health of women and children,” and built gender considerations into its design: “Ensuring women's empowerment, especially in rural India, the connections will be issued in the name of women of the households” (PM Ujjwala Yojana, n.d.). The government has reported that the target of new connections was achieved in August 2018 (*Financial Express*, 2018). In anticipation of this, it committed to achieving 80 million LPG connections for women from poor households by the end of 2019 (Jacob, 2018).

PMUY assists poor households by absorbing half of the cost of acquiring an LPG connection. The government contribution of INR 1,600 (USD 24.4) covers the cost of a security deposit (for possession of a 14.2 kg LPG cylinder and pressure regulator), the hose pipe and installation and administrative charges (PM Ujjwala Yojana, n.d.; MoPNG, 2018). The subsidy must be received in a female beneficiary's bank account. Households then

³ In India, it is common for people to talk about having an LPG “connection.” This term can cause some confusion for international readers, because it implies some kind of distribution infrastructure, to which one is physically connected. In fact, the term simply refers to having been registered in the country's consumer subsidy system, which requires households to go through several steps to be authenticated. In this paper, we also use the term “connection” in contrast to a subsidy for “consumption.” A consumption subsidy is a transfer that covers some or all of the cost a product when it is consumed. A connection subsidy is a transfer that covers some or all of the cost associated with using a product for the first time. For LPG, this includes the metal cylinder that contains the gas, the first load of gas in the cylinder and the stove and associated equipment required to use LPG for cooking.

⁴ In March 2014 and June 2015, the LPG subsidy was more than 50 per cent of the market price. See Table 3 for detailed subsidy calculations.



have to bear the costs of purchasing their LPG stove and initial refill (MoPNG, 2018). If they cannot pay upfront for the stove and their first refill, the LPG distributors can offer the female beneficiary a loan to help cover these costs (MoPNG, 2016; MoPNG, 2018). No official data were found stating the typical size of this loan, but in 2018 the average cost of a subsidized LPG refill across Delhi, Kolkata, Mumbai and Chennai was INR 495 (USD 7.6) (Indian Oil Corporation Ltd. [IOCL], n.d.), and a review of vendor websites suggests that the standard value of a stove is as low as INR 540 (USD 8.3) (MySmartPrice.com, n.d.; Flipkart, n.d.). This implies that cost to households in 2018 was at the lowest INR 1,035 (USD 16) and possibly higher, depending on availability of low-cost stoves. Various non-official sources have reported an average loan to households of around INR 1,500 (USD 23.2) (PM Ujjwala Yojana, n.d.; Anand, 2018). This is paid back in EMI, through deductions from the DBTL subsidy that is transferred for each new LPG cylinder refill (effectively resulting in higher LPG prices until the loan is repaid).

To acquire a PMUY LPG connection, women from poor households need to open bank accounts, acquire the *Aadhaar* (national identity document),⁵ and possess a BPL card, be part of a poverty database (the Socio Economic Caste Census—SECC 2011) or fall into one of several categories associated with being below the poverty line (MoPNG, 2018). If they own a mobile phone, this can also be registered to help facilitate payments.

During the same period, the government has also experimented with a number of approaches to limit LPG subsidy expenditure (see GSI, 2018, for a discussion of these). This includes a cap on the sale of subsidized LPG cylinders and a voluntary surrender of the LPG subsidy called “GiveItUp.” In 2016, the government introduced income-based targeting that reduced the eligibility of the LPG subsidy to only those households whose annual income is less than INR 1 million (USD 15,276). Further, in 2016 the government introduced a series of gradual increases to the price of LPG.

⁵ Under its original design, the PMUY scheme required beneficiaries to have some form of photo ID, and specified that an *Aadhaar* card or a voter ID card would be sufficient. In March 2017, the government announced that all beneficiaries would be required to possess an *Aadhaar* card (Ministry of Petroleum and Natural Gas, 2017). Since its introduction, the linking of India’s *Aadhaar* identification system to social security services has been subject to intense debate and legal disputes. In September 2018, the Supreme Court ruled that the government may require the possession of an *Aadhaar* card to help manage subsidies and benefits (Supreme Court of India, 2018).



4.0 Results

In order to explore the gender-disaggregated impacts of subsidies and their reform, this section examines as its baseline the PAHAL (DBTL) LPG subsidy cash transfer mechanism as it operated from 2014 to 2016. It then examines the impact of introduction of the PMUY as an instance of reform, as well as more generally exploring households' perceptions of how they would behave in light of any reduction in the PAHAL (DBTL) consumption subsidies that they receive.

4.1 Do Existing LPG Subsidies Work for Poor Women?

This section examines how the PAHAL (DBTL) subsidy benefits poor women in terms of its impact on their income, energy use and energy supply. The PAHAL (DBTL) subsidy as it existed in 2014 was a form of a cash transfer mechanism, where households pay market prices for LPG cylinders and then receive the subsidy amount directly in their bank accounts. This reduced the net price of LPG cylinders, and without any filters to exclude the rich or target women or poor households.⁶

4.1.1 Income Effect

An income effect is created when subsidies reduce the purchase price of LPG for households, thereby effectively supplementing their incomes (Kitson et al., 2016). An income effect takes place if households are consuming LPG and receiving the subsidy. If subsidies are intended to promote energy access and to ease poverty, it would be most efficient if this income effect were concentrated on poor households. Within the household, the extent to which a subsidy will affect women and men differently will depend upon who typically purchases a subsidized product—and, in the case of the PAHAL (DBTL) system, who receives a subsidy transfer.

LPG usage has increased slowly in Jharkhand from 2011 to 2018. In 2011, 2.9 per cent of households used LPG as their primary cooking fuel, which increased to 5 per cent in 2015 (Jain et al., 2015). By 2018, 20 per cent were using LPG as their primary cooking fuel and 31 per cent were using a mix of biomass and LPG (Jain et al., 2018). Similar state-level data for Chhattisgarh is unavailable.

In order to determine the extent to which poor households experienced an income effect, it is necessary to have a dataset that includes LPG usage and some proxy for wealth. No such data were identified for the beginning of our period of study, 2014. The closest available data are from a survey conducted in 2011-12 (NSSO, 2015, p. 7). These data show that, typically, the percentage of households that primarily rely on LPG increases in line with monthly per capita expenditure (NSSO, 2015).

As of 2011, across both states, the average rate of LPG usage among the bottom 40 per cent of the population was only 4.6 per cent. Divisions between rural and urban areas were stark. In rural areas in both states, households in the bottom 40 per cent of expenditure—which can be taken roughly as the population of poor households in both states⁷—were not using LPG as a primary cooking fuel at all, and instead used biomass (see Figure 2). In 2011, an overwhelming majority of the bottom 40 per cent of the rural population in both states were using biomass primarily for cooking (NSSO, 2015). In comparison, among urban households in the bottom 40 per cent by expenditure, LPG was the primary source of cooking fuel for around 9.6 per cent in Chhattisgarh and 26.5 per cent in Jharkhand (see Figure 3). Statistical analysis of NSSO data by Saxena & Bhattacharya (2017) has further found that India's major disadvantaged groups—scheduled castes, scheduled

⁶ To help limit unnecessary consumption, the PAHAL (DBTL) system also has an annual cap on purchasing subsidized LPG refills. This varied over a short period, and finally was set at 12 (14.2kg) LPG cylinders. Very few households consume above this level, so despite the long-standing existence of the cap, it has very little impact on the universality of the subsidy policy.

⁷ As of 2012, the poverty rate in Chhattisgarh was estimated at 40 per cent and in Jharkhand at 37 per cent (World Bank, 2016).



tribes and Muslims—had lower levels of access to LPG than other groups, even when controlling for socioeconomic factors that influence demand and supply.

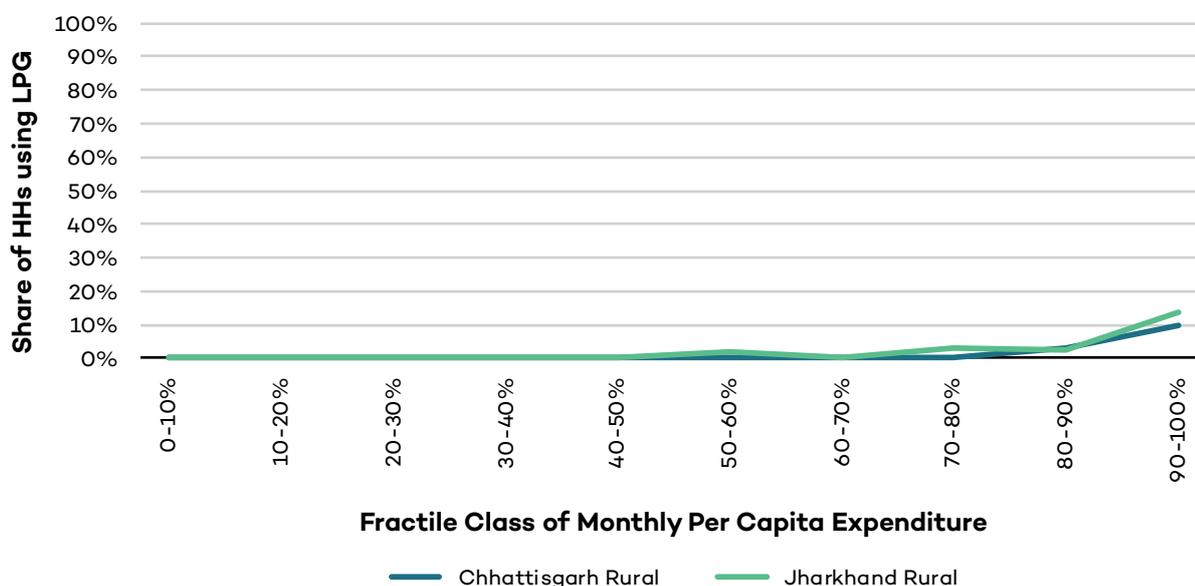


Figure 2. Rural household use of LPG as primary fuel for cooking across deciles of monthly per capita expenditure, 2011

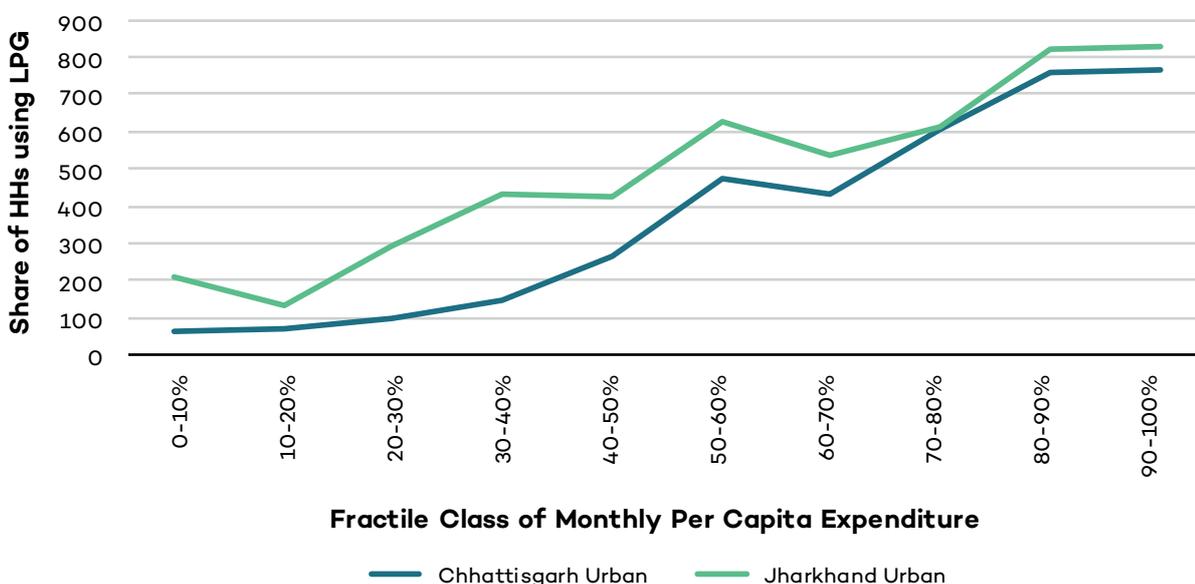


Figure 3. Urban household use of LPG as primary cooking fuel in each decile of monthly per capita expenditure, 2011

Note: In interpreting this figure, readers should note that average incomes are lower in rural areas of both states; and that around 75 per cent of the population in each state is non-urban (NSSO, 2015).

Source: NSSO, 2015.

The above data are broadly reliable as a proxy for the distributional incidence of subsidies at a household level in 2014, as the level of LPG consumption subsidies had remained similar over these years. The only major disruption was the 2014 introduction of the PAHAL (DBTL) system for administering subsidies through a cash transfer mechanism, which may have reduced levels of household consumption, at least in its initial years.



The PAHAL (DBTL) system requires beneficiaries to register with a bank account and identification, all held in the name of one household member, with mobile phone registration also possible to help facilitate payments. This system is intended to prevent illegal diversion of fuel, but it can also create barriers to access. In a district of Uttar Pradesh, survey research in 2015 found that only 65 per cent of households had a member who met all of the necessary prerequisites (Parikh et al., 2016). As a result, in the short term at least, it is likely that PAHAL prevented some households from accessing the subsidy at all. There are no data to indicate how this effect was distributed across income groups but rural and low-income households are most likely to have faced the greatest challenges in obtaining requirements and using them to register. The same study found 15 per cent of the households were not receiving the subsidy in their bank accounts. The most common reason for this was a mismatch in the name on the official LPG connection registry and the bank account (Parikh et al., 2016).

The significance of the income transfer that is or is not received is linked to how much LPG is consumed, what this represents as a share of the average household budget and the share of the LPG cylinder price supported by the subsidy transfer. Data from 2011–12 show that urban households in both states spent significantly more on energy than rural households, yet, rural households dedicated a larger share of their total monthly expenditure to energy (see Table 4).

In 2011–12, the PAHAL (DBTL) cash transfer system had not been introduced, so the data reflect the costs of purchasing LPG directly in the market at subsidized prices. Even with these subsidies, the data indicate that LPG was a significant share of household budgets. In urban areas, it accounted on average for 1.6 per cent and 2.7 per cent of total household expenditure in Chhattisgarh and Jharkhand, respectively. The size of subsidy transfers in India has varied significantly depending on world LPG prices, but in financial year 2012–13, the average subsidy value per 14.2kg cylinder was estimated at INR 427 (USD 7.8) per 14.2kg cylinder, around three times the average monthly energy expenditure in these states in 2011–12 (Clarke, 2014).

Table 4. Per capita expenditure on energy 2011–12

Expenditure (monthly per capital)	Jharkhand rural	Chhattisgarh rural	Jharkhand urban	Chhattisgarh urban
Energy expenditure in INR (USD)	90 (1.8)	98 (2.4)	136 (2.8)	137 (2.8)
Energy as a % of total expenditure	9%	10%	7%	7%
LPG expenditure as a % of total energy expenditure	3%	2%	39%	24%

Source: NSSO, 2014.

The extent to which the income effect may have had gender-differentiated impacts depends on intra-household dynamics—i.e., the relative income of male and female household members, and how their income is usually spent and shared. The fourth round of the NFHS conducted in 2015–16 in Chhattisgarh found that only 37 per cent of all women aged 15–49 were employed and earning cash in the 12 months preceding the survey, in comparison to 78 per cent of men. It also found that 58 per cent of married women reported that they earned less than their husbands (Ministry of Health and Family Welfare, 2017). The factors that were associated with women having money that they personally control were: living in urban areas; being older; and having 12 or more years of education (Ministry of Health and Family Welfare, 2017). This suggests significant income disparity between women and men, which would be concentrated among rural and disadvantaged households. At the same time, 78 per cent of married women in Chhattisgarh reported that major household purchases were made jointly with their husbands, and 14 per cent reported that these decisions were made mainly by husbands (Ministry of Health and Family Welfare, 2017). This suggests that, despite significant intra-household income



inequality, women have some degree of control over joint household incomes. No equivalent fourth-round NFHS data were available for Jharkhand, but this state showed similar characteristics to Chhattisgarh in the previous round of the NFHS in 2005 (Ministry of Health and Family Welfare, 2007).

No data were identified in 2014 that showed the extent to which women or men were primarily responsible for purchasing cooking fuel, but it is likely that the introduction of the PAHAL (DBTL) may have biased LPG purchase and the receipt of LPG subsidies toward male household members. This is because the policy required beneficiaries to register with a bank account and identification, as well as optional linkage with mobile phones. Data from the World Bank's Global Financial Inclusion Database show that in 2014 in India, 63 per cent of men over 15 years old held bank accounts, in contrast to 43 per cent of women (World Bank, 2017); while the NFHS found that in 2015–16, only 31 per cent of women in Chhattisgarh owned a mobile phone that they used themselves, and of this sub-population, only 75 per cent could read text messages (Ministry of Health and Family Welfare, 2017).

Finally, it should be noted that the poor targeting of the PAHAL (DBTL) subsidy resulted in a very high absolute cost for the policy. In 2014, the total value of energy subsidy expenditure on the PAHAL (DBTL) subsidy was estimated at INR 38,690 million (USD 0.6 billion) (Soman et al., 2018).

Overall, in 2011, the accessibility of LPG was limited in Chhattisgarh and Jharkhand, and most low-income households cooked on firewood, followed by dung cake and coal. As a result, the majority of LPG subsidies in these states were captured by non-poor households. Within households, women were likely to have significantly lower personal incomes than men, and the administration of the subsidy policy had likely biased the responsibility of LPG purchases—as well as the receipt of LPG subsidy transfers—toward men.

4.1.2 Energy Use Effect

An “energy use” effect takes place when a subsidy changes the relative price of fuels, thereby increasing the consumption of subsidized fuel. This is particularly important for women, because they tend to be the main beneficiaries of a transition away from biomass, with benefits to health and time use, given that they do most of the cooking.

Analysis has shown that LPG with consumer subsidies has a lower price per calorific value (INR per megajoule) when compared to other purchased fuels, including purchased biomass (Jain et al., 2015). This implies that when households pay for biomass, they end up spending more on cooking energy than households who exclusively use LPG purchased through the PAHAL (DBTL) system.

While we might expect this to drive an immediate shift toward LPG, the market in 2014 had not shifted accordingly. This is likely because expenditure on LPG tends to require infrequent but high-value purchases, while expenditure on biomass is easier to spread over time in small purchases; and because most biomass, particularly in rural areas, is not purchased. Because women's labour is typically not allocated financial value by households, biomass is often perceived as the lower-cost fuel—and even with very large subsidies, it is highly challenging to bring a cleaner alternative into price competitiveness with a fuel that is perceived to be “free.”

Any barriers experienced in accessing an energy subsidy can also affect price differentials. As explained previously, as of 2014, the administrative requirements to register under PAHAL (DBTL), as well as initial problems with the receipt of transfers, may have created disproportionate barriers to access among rural and disadvantaged households, and women were less likely to have possessed the necessary prerequisites to become beneficiaries. In addition, in 2014 the upfront cost of acquiring an LPG connection was another important factor in the relative price of LPG compared to traditional fuel, reducing the extent to which the price of consumption subsidies was likely to influence energy use. The expenditure by a household on subsidized LPG can be broken up into connection costs and consumption costs. In 2012–13, only 13 per cent of the cost of



acquiring LPG went toward fuel consumption (IRADe, 2014, p. 4). The remaining 87 per cent of the cost of acquiring LPG was attributed to setup costs (including the security deposit for the cylinder, cost of stove, hose) and administrative costs.

Even when subsidies increase LPG consumption, they will not necessarily drive down the use of harmful, traditional biomass fuels significantly. Fuel stacking—using a dominant fuel along with supplementary fuels—has continued. This saves total cooking fuel costs for households, but it continues to expose them to dangerous levels of indoor air pollution and the time burden associated with fuel collection. In 2010, as access to LPG increased, approximately 12 per cent of households nationally were using both biomass and LPG for cooking, compared to less than 0.5 per cent in 1987 (Cheng & Urpelainen, 2014).

A survey of 1,216 households in Bihar, Uttar Pradesh, Madhya Pradesh and Rajasthan between 2014 and 2018 found that 98 per cent of households with an LPG connection also used a *chulha* biomass stove (Gupta, et al., 2019). Only 27 per cent used LPG exclusively and 36 per cent used a *chulha* exclusively even if they had an LPG connection.

The cooking fuel used by households may impact gender-disaggregated cooking patterns. As noted previously, men were the primary cooks in only five of the 810 surveyed households but did some of the cooking in 521 of the remaining households. Of this 521, 238 households were using biomass as their only cooking fuel. Males appear to be more likely to cook if LPG is available: 70 per cent of households having LPG connection said a male member cooked at least one meal in the last 30 days, against the 58 per cent of households who did not have an LPG connection.

Traditional cooking fuels are associated with health and time costs for women, so an energy use effect is typically expected to bring specific benefits to women. The 1998–99 time-use survey (CSO, 1998) (the only official time-use survey available), found on average that women spent 18.32 hours per week cooking food and cleaning utensils, whereas, men spent 0.62 hours per week. This excludes time for collection of traditional fuel, also typically the responsibility of women and young girls in rural areas. Numerous studies have documented the health impacts that women suffer from cooking with traditional fuels, which could be alleviated if indoor air pollution were reduced to safe levels or eliminated (Smith, 2002; Boadi & Kuitunen, 2006; Parikh, 2011; Das, 2012). There is also some evidence on the time savings from shifting to LPG. A GSI-supported study by Parikh et al. (2016) evaluated the impact of fuel switching from biomass to kerosene or LPG among the urban poor in the Ghaziabad Municipal Corporation, Uttar Pradesh. It reported that households were able to save two hours a week from cooking alone, not including fuel collection for biomass and queuing and travelling time from kerosene collection.

4.1.3 Energy Supply Effect

LPG subsidies can create an energy supply effect by creating incentives for fuel diversion, which in turn can have impacts for men and women, such as shortages that increase the time spent in queues or push prices up. However, LPG subsidies in India under the PAHAL (DBTL) subsidy mechanism are closely monitored, limiting the potential for diversion and shortages.

LPG cylinders are home-delivered, except in some remote rural areas, where households have to collect LPG cylinders from distributors. A study in Uttar Pradesh found that most households purchase a single cylinder, for which they receive one subsidized refill at a time (Parikh et al., 2016).⁸ When the single LPG cylinder is exhausted, households have to place a request for a refill. The delivery of a refill takes approximately 3 to 4 days, so households use an alternate fuel while they are waiting for the new supply—charcoal, biomass, or kerosene (Parikh et al., 2016, p. 10).

⁸ Households have an option to pay a higher price and acquire a double cylinder connection that permits them to purchase two subsidized cylinders simultaneously.



The price of LPG can vary depending on the source of purchase. Households that acquire an official LPG connection from an LPG distributor of one of the three government oil companies are charged the government-notified price and receive the LPG PAHAL (DBTL) subsidy. Those that purchase an LPG cylinder from a private vendor operating in the open market can be charged a higher price and are not part of the PAHAL (DBTL) registry, so they do not receive the subsidy. Table 5 shows a breakdown of price and subsidies over the value chain just before the introduction of PAHAL (DBTL) in March 2014; and after its introduction, in June 2015. The value of the subsidy can vary significantly depending on the market price for LPG. In March 2014, it was set at almost 70 per cent of the import price; while in June 2015, it was around 45 per cent of the import price; and the final, “effective” price paid by consumers saw virtually no change.

Table 5. Price buildup of LPG in 2014 (prior to DBTL) and 2015 (under DBTL)

Elements	Cost (INR per 14.2 kg cylinder)	
	March 2014	June 2015
(1) Import Price	906	456
(2) Add: storage, bottling, distribution, cylinder charges, delivery charges, any other uncompensated costs	95	125
(3) Less: Subsidy by central government and oil companies	628	0
(4) Selling price to LPG distributor (1+2-3)	373	582
(5) Add: LPG Distributor Commission	41	45
(6) Price paid by consumer (4+5)	415	627
(7) Subsidy transfer to consumer's bank account under DBTL	0	209
Effective price paid by consumer (6-7)	415	418

Sources: HPCL, 2014; PPAC, 2015.

4.2 How Do LPG Subsidy Reforms Impact Poor Women?

This section examines the impact of the 2016 introduction of the PMUY program on women from poor households, through primary data collected in 2017 for this research. The PMUY program provides one-time assistance to households in acquiring an LPG connection, targeted at women from poor households, on the condition that they open bank accounts, show proof of identity and are listed in a poverty database.

The subsidy consists of INR 1,600 (USD 24.4) to women to pay the security deposit (for a 14.2 kg LPG cylinder and regulator), as well as a hosepipe and other administrative charges. For an LPG stove and a first gas refill, women can then pay directly themselves or take an optional loan, which would be paid back through deductions on the DBTL consumption subsidy. No official data were identified on the cost of a stove and the first refill, but various sources suggest that as of 2018 it is between INR 1,035 to INR 1,500 (USD 16 to USD 23) (IOCL, n.d.; MySmartPrice.com, n.d.; Flipkart, n.d.; PM Ujjwala Yojana, n.d.; Anand, 2018). Once the loan is fully paid, eligible women can benefit from the DBTL policy as normal, receiving a subsidy transfer in their bank accounts each time they purchased a 14.2kg cylinder of LPG, with a cap of 12 cylinders per year.

There have been some reports of PMUY recipients having to pay a bribe to distributors to access their connection (Economic Times, 2019). According to the media report, recipients were asked to pay INR 3,000 to INR 4,700 to receive or retain their connection.



This section examines the extent to which women from poor households have benefited through the PMUY scheme. It is based on a household survey conducted in summer 2017 for this research, FGDs and interviews, as well as a review of secondary literature. Details on the collection of primary data are available in the methodology section.

The project's survey data allowed for households to be classified into five income groups (see Table 6) based on equal quintiles. Group 1 has a monthly income of less than INR 6,000 (USD 89) per month. The Government of India's (GoI's) 2011–12 criteria for defining poverty use consumption expenditure, where a five-member household is deemed poor if they spend less than INR 4,860 (USD 101.4) in total per month in rural areas and less than INR 7,035 (USD 146.86) in total per month in urban areas (Planning Commission, 2014, p. 60). Given that our sample has income and not expenditure information, it is difficult to directly map the government's poverty criteria onto the sample. The income categories can nonetheless be used to illustrate differences between lower- and higher-income groups in these states.

Table 6. Monthly income classification of sample data from Ranchi and Raipur districts

Income group	Household income					
	Rural households			Urban households		
	Range (INR)	Mean	Standard Deviation	Range (INR)	Mean	Standard Deviation
Group 1	≤5,999	4,537 (92)	1,026	≤6,279	5,050 (66)	1,140
Group 2	6,000–7,799	6,724 (97)	625	6,280–8,449	7,417 (65)	476
Group 3	7,800–10,199	8,910 (98)	754	8,450–10,703	9,211 (67)	597
Group 4	10,200–14,206	11,944 (97)	1,084	10,704–14,539	12,258 (66)	1,044
Group 5	≥14,207	22,396 (96)	10,101	≥14,540	23,427 (66)	10,125

Note: Figures in parenthesis are number of households

Source: IRADe survey data, 2017.

An alternative way to identify poverty is to use the government's poverty card as a proxy. This card, issued to households, has two main different categories: below poverty line (BPL) and above poverty line (APL).⁹ Although it is fraught with design and implementation flaws, as discussed by Jain (2004) and Mahamallik & Sahu (2011), it is another relevant metric for disaggregating the sample. In total, 52 per cent of sample households reported possession of BPL cards, 34 per cent APL cards, and the remaining 14 per cent reported that they did not have official documents to prove their poverty status. A poverty rate of this magnitude is higher than estimated for the two districts from official sources, based on state-specific estimates of average monthly per capita expenditure, as per Mixed Reference Period for 2011–12 and NSSO 2011–12 district-specific consumption expenditure data—32 per cent in Ranchi and 45 per cent in Raipur (Planning Commission, 2013).

⁹ BPL and APL cards derive from India's Public Distribution System (PDS), originally developed to help manage food scarcity and provide food to citizens at affordable prices (MoCAFPD, n.d.). The requirements for BPL status vary between different states, by assessing a variety of parameters that determine whether a household is able to meet its basic food needs.



4.2.1 Income Effect

Overall, 50 per cent of households in the sample were using LPG as part of their energy mix, and 22.5 per cent of the sample was using LPG as a primary cooking fuel.¹⁰ The remaining 50 per cent of households were not using LPG at all.

Among the LPG-using households, 52 per cent were BPL card holders and the remaining did not hold BPL cards. Among LPG-using and BPL card-holding households, 31 per cent were using LPG as a primary fuel (11 per cent of all surveyed households).

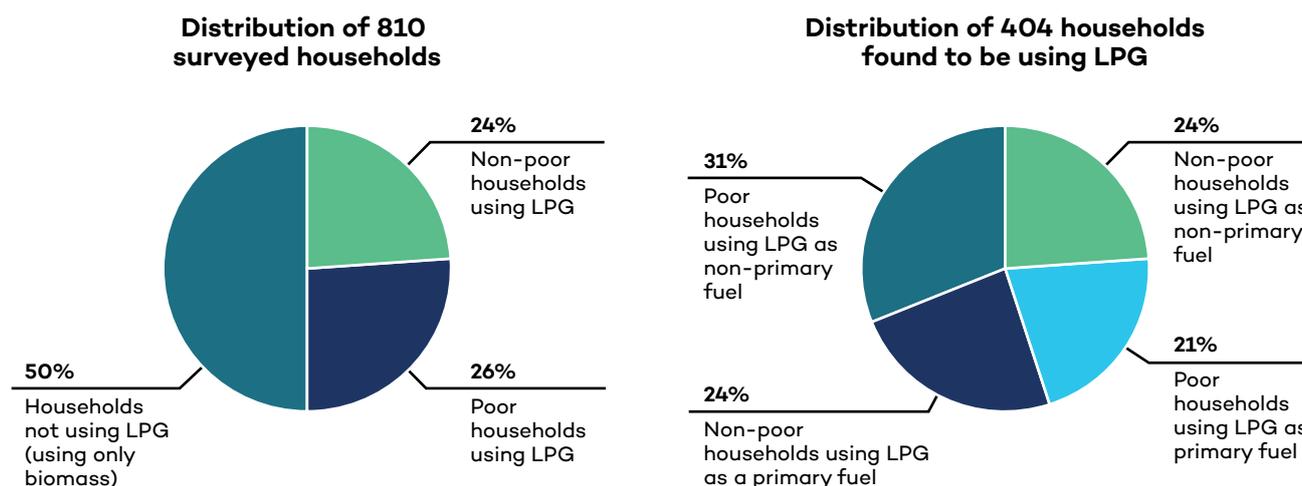


Figure 4. Distribution of surveyed households

Source: IRADe survey data, 2017.

In the absence of district-level data from previous years, it is difficult to compare and conclude to what extent there was a change in the income effect of LPG subsidies by 2017, part of which could reasonably be attributed to PMUY. Nonetheless, assuming that the sample is representative of the total population of both states, this suggests a significant increase in average rates of LPG usage as a primary cooking fuel: an average of 22.5 per cent of households in the 2017 survey (and 20 per cent for Jharkhand in Jain et al., 2018), in comparison to an average rate of 11.8 per cent across both Chhattisgarh and Jharkhand, as per NSSO data from 2011–12.

Among low-income households around 21 per cent of the LPG-using households were BPL card holders. Although BPL card ownership is an uncertain proxy for poverty, this again compares favourably to NSSO data from 2011–12, when only 4.6 per cent of households in the bottom 40 per cent of rural and urban groups in both states were using LPG as their primary cooking fuel.

Another way to explore the impact on incomes is by analyzing cooking energy per income group. Households use a range of cooking fuels, all totalling up to different levels of cooking energy. This average energy (megajoule) per fuel per month can be calculated for each household by multiplying the quantity with the calorific value for each fuel. Figure 5 describes the monthly cooking energy for different income quintiles, disaggregated by fuels. The figure reveals that as income increases, monthly cooking energy use increases. This suggests that despite the presence of PMUY to target connection barriers, the income effect of PAHAL (DBTL) LPG consumption subsidies continues to be limited by affordability constraints. It also reveals that for higher-income groups, where affordability is not a constraint, LPG is still not used for 100 per cent of the cooking fuel mix. This confirms evidence from 2014 that suggests that affordability is not the only limitation for adoption,

¹⁰ Calculations on the use of LPG as a primary fuel are based on the assumption that average monthly consumption of 10 kg of LPG per household qualifies LPG as a primary cooking fuel for the household (Parikh et al., 2016).



and that low-cost LPG alone is not sufficient to drive a transition away from harmful forms of biomass combustion. The availability of biomass, along with attitudes toward women’s time, labour and other variables, may all be factors that influence rates of LPG usage and ongoing biomass consumption.

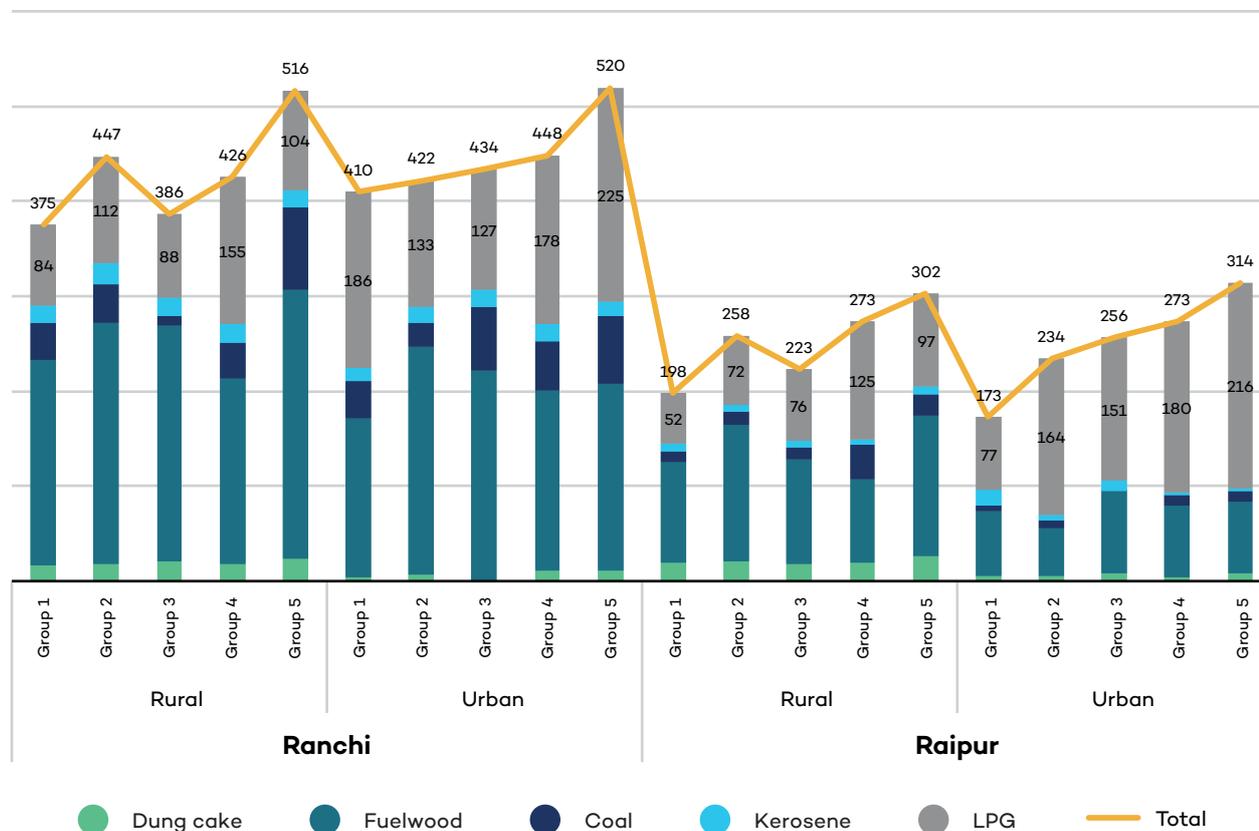


Figure 5. Cooking fuel mix: Average monthly cooking energy consumption (MJ) per household disaggregated by fuels of different income groups in Ranchi and Raipur

Source: IRADe survey data, 2017.

PMUY’s impact on the incomes of poorer households may also be affected by its targeting and administrative requirements. The PMUY targets households depending on BPL card ownership, but inclusion and exclusion errors in the existing BPL targeting system are therefore also a concern for PMUY subsidies. Table 7 shows the distribution of 126 households enrolled in LPG subsidies through PMUY (126 out of 810, 15 per cent of the overall sample). Though all these households have BPL cards, only 48 per cent of card holders are from the poorest 40 per cent of households (Groups 1 and 2 in Table 7), while 36 per cent of card holders are from the richest two groups (Group 4 and Group 5). This suggests that there is substantial potential for further improving targeting of PMUY to the poorest.



Table 7. Distribution of 126 PMUY beneficiaries across income groups (numbers are count of households)

Income groups	Rural		Urban		Total	Total %
	Ranchi	Raipur	Ranchi	Raipur		
Group 1	12	10	7	1	30	24%
Group 2	6	16	6	2	30	24%
Group 3	3	11	2	4	20	16%
Group 4	8	18	3	0	29	23%
Group 5	5	7	5	0	17	13%
Total PMUY Households in Sample					126	100%

Source: IRADe survey data, 2017.

While PMUY and PAHAL (DBTL) both have similar administrative requirements, the PMUY is significantly different from PAHAL (DBTL) in requiring all beneficiaries to be female household members. This may have negative and positive impacts for women in low-income households. On the one hand, as noted in the analysis of subsidies in 2014, women may be less likely to possess the documentation required for registration, so designing the PMUY in this way might cut off certain households who would otherwise register through a male household member, with health and time implications for women. On the other hand, this requirement may help drive women's access to financial services and mobile phones, creating important spillover benefits.

Gender inequality linked to financial inclusion has also narrowed dramatically since 2014 as part of larger drives to promote financial inclusion nationally (Ministry of Finance, 2018). The Global Financial Inclusion Index reports that as of 2017, 83 per cent of men and 77 per cent of women over 15 years old in India had a bank account, compared to only 63 per cent and 43 per cent in 2014 (World Bank, 2017). While a gap still exists, it has narrowed significantly in a short time. By emphasizing the need for women's agency, the policy may also help contribute toward improved empowerment for women.

Overall, the evidence suggests that a significant increase in LPG usage has taken place since 2014. As the most significant new policy development, it seems reasonable to conclude that the PMUY has played a significant role in creating a large share of these new users. This is consistent with government reports that PMUY has provided over 35 million new connections across the country as of April 2018 (PPAC, 2018a). Other factors, however, will also have contributed to the change, and it is difficult to accurately estimate the relative role they may have played. These factors likely include: the ongoing influence of low prices through the PAHAL (DBTL) system, along with growing incomes; efforts to improve LPG distribution in rural areas (see the sub-section on "Energy Supply" below for more information); efforts to improve financial inclusion, and thereby ability to register for both PAHAL (DBTL) and PMUY support; and growing household awareness about LPG and its convenience.

In theory, the PMUY policy ought to have improved the targeting of the existing PAHAL (DBTL) subsidies to some extent. This is because the PMUY adds a disproportionate number of low-income households to the overall list of beneficiaries, so a higher overall share of PAHAL (DBTL) beneficiaries will be low-income. This comes at the cost, however, of increasing the total overall number of beneficiaries and thereby the overall total burden of LPG subsidy expenditure. It also assumes that low-income PMUY beneficiaries will consume similar levels of LPG to any new high-income beneficiaries that have been added—but data on fuel consumption suggests that this is not the case. As a result, it is not feasible to determine whether the PMUY has affected the efficiency of the PAHAL (DBTL) system, other than to note it has increased overall costs. It should be noted, however, that a 2018 review of India's energy subsidies found that the cost of PAHAL (DBT) subsidies had grown from INR 39 billion in FY2014 to INR 209 billion in FY2018 (USD 0.6 to USD 3.2 billion), while



expenditure on the PMUY in FY2018 was only INR 25 billion (USD 0.4 billion) (Soman et al., 2018). This illustrates the extent to which inefficient expenditure may have an opportunity cost in terms of the income effect that could be clustered on the poorest, as well as the relative emphasis placed on consumption subsidies rather than connection subsidies.

4.2.1.1 Urban Households Have Higher Cooking Expenditure Than Rural Households

Energy prices are calculated as INR spent per MJ. At the time of the survey, the market price of dung cake was INR 3 per kg (USD 0.04), with a calorific value of 1.7 MJ per kg. This created an energy price for dung cake at INR 1.76 per MJ. Similarly, energy prices for other fuels are calculated in Ranchi and Raipur (see Table 8). In terms of energy prices, subsidized LPG is more affordable per calorific value than other purchased fuels, as the price per MJ is the lowest, implying less fuel is required to generate the same energy. However, particularly in rural areas, it is challenging for any subsidized fuel to compete with biomass that is considered freely available, because women’s time and labour are not assigned financial value. The introduction of the PMUY has not influenced this challenging problem.

The sample data reveals that as incomes increase, households’ cooking expenditure as a share of income decreases (see Figure 6). In urban Raipur, where LPG adoption increases with income, the lower energy price of LPG contributes to a sharper decline in energy expenditure. Urban households spend a higher share on cooking energy than their rural counterparts because urban households use a higher proportion of purchased fuels, rather than collected or prepared fuels.

Table 8. Energy differentiated fuel prices in Ranchi and Raipur

Fuel	Market price (INR per kg)	Calorific value (MJ per kg)	Energy price (INR per MJ)
Dungcake	3	1.7	1.76
Fuelwood	6.2 (Ranchi) 8.5 (Raipur)	2.4	2.6 (Ranchi) 3.5 (Raipur)
Subsidized LPG	35	27.3	1.28

Source: IRADe survey data, 2017.

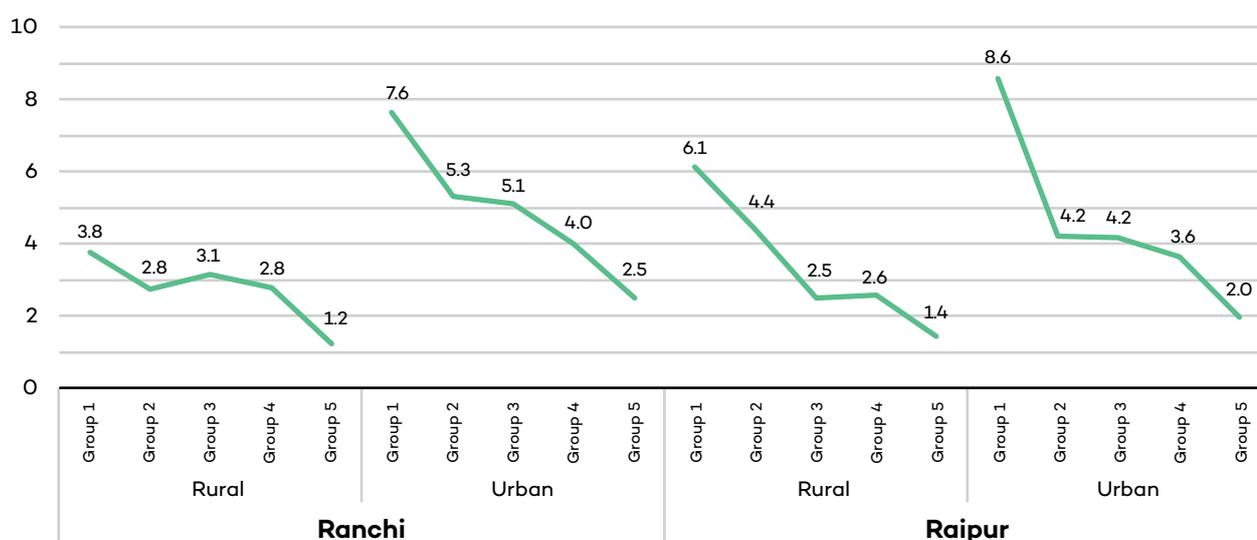


Figure 6. Cooking energy expenditure as a percentage of household income

Source: IRADe survey data, 2017.



4.2.1.2 In Rural Areas Fuel Management Responsibility Transitions From Women to Men With LPG Adoption

When identifying the impacts of existing LPG subsidies in 2014, no detailed data were available on the gender-disaggregated responsibilities for collecting or purchasing different energy types—only NFHS data on large household purchases. Our survey revealed that women are responsible for collection and preparation of fuels like dung cake and fuelwood; and while they were still predominantly responsible for LPG collection, a larger share of men were involved compared to other fuels (see Figure 7). The main exception to this was in rural areas, where LPG collection was predominantly the responsibility of men. This is likely because LPG is not delivered at the house and has to be collected from the LPG distributor. This suggests that as households transition from biomass to LPG for cooking, the role of women in fuel management declines and that of men increases—but that this may reflect existing gender norms about men and women’s roles, and not necessarily improved burden of responsibility between men and women.

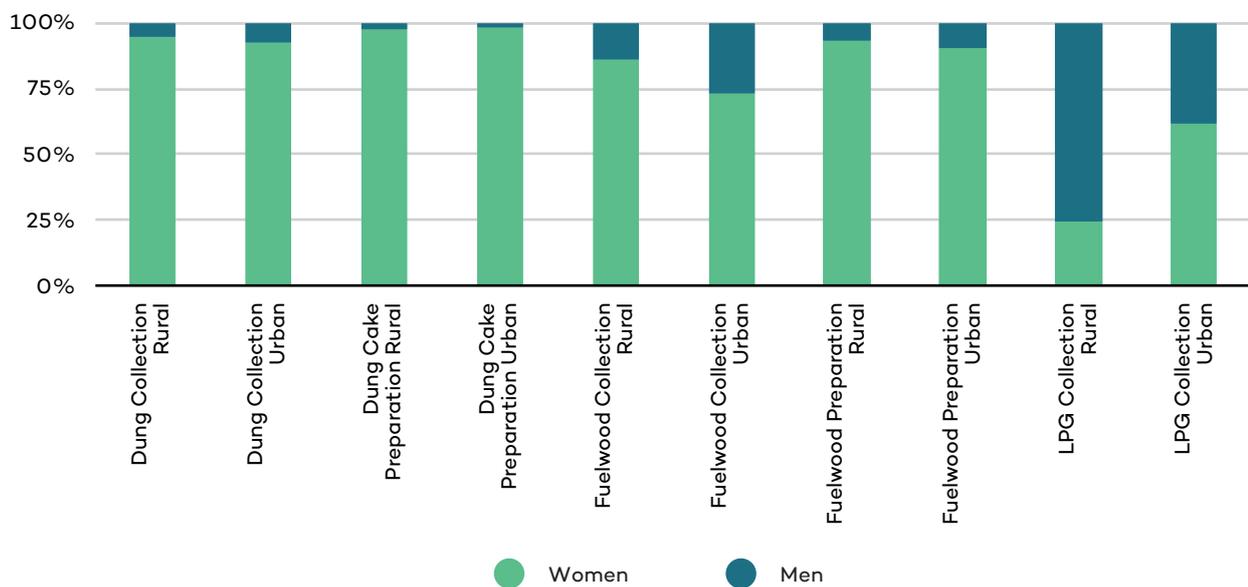


Figure 7. Fuel management: Gender-disaggregated responsibilities in collection and preparation for different fuels

Source: IRADe survey data, 2017.

4.2.1.3 Choice of Cooking Fuel Is Determined by Women

Our survey found that in 74 per cent of households women made decisions on cooking energy sources (see Figure 8). This is consistent with the 2015–16 National Family Health Survey that observed that 78 per cent of married women in Chhattisgarh reported that major household purchases were made jointly with their husband (Ministry Of Health And Family Welfare, 2017). Since the PMUY scheme provides only female beneficiaries with subsidies for an LPG connection, it is reasonable to infer that it has placed more decision-making power in the hands of women. At the same time this finding (74 per cent of women made decisions on cooking energy sources) may also be linked to the availability of ‘free’ biomass for cooking, where our survey also confirmed that the responsibility for collection and preparation of solid fuels lies with women (Figure 7).

In India, our survey found that on the other hand men were found to be decision-makers for lighting energy needs in 77 per cent of households, with women deciding on lighting energy needs in only 12 per cent of the households.

It remains unclear if men may be making decisions on lighting because it may involve exchanges with external agencies and stakeholders. This assumption draws from existing studies that women may not be decision-



makers for energy decisions that involve social restrictions on leaving their homes (Cecelski, 2004; Cooke, Köhlin, & Hyde, 2008).

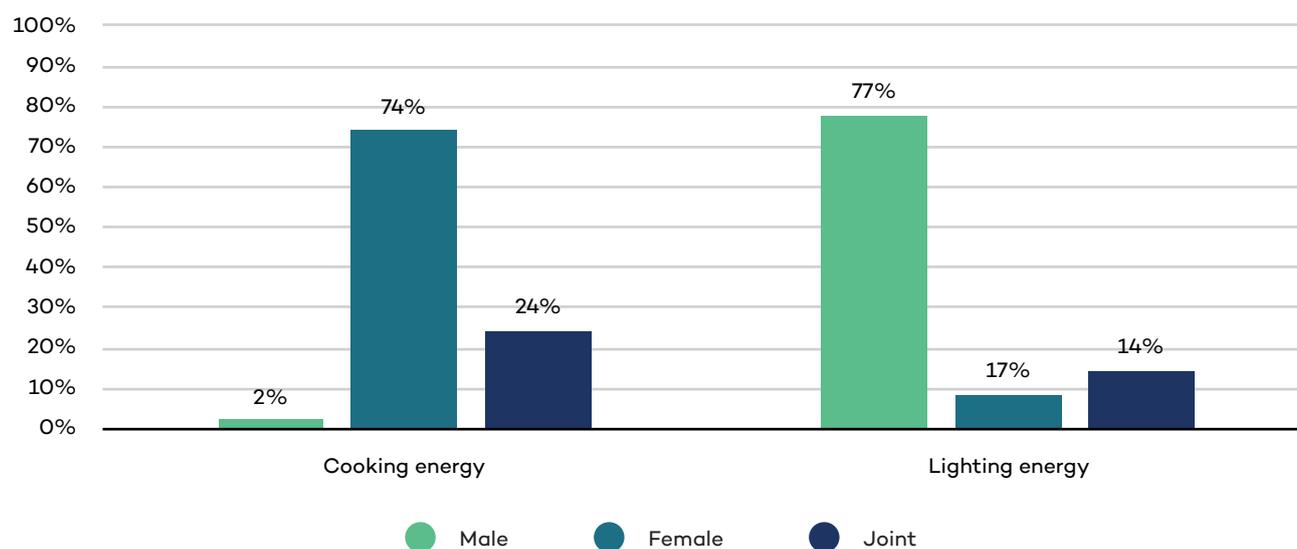


Figure 8. Decision making on cooking and lighting energy

Source: IRADe survey data, 2017.

4.2.1.4 Coping Mechanisms

The survey studied households' responses to a hypothetical price hike of between INR 300–INR 400 (USD 4.4 to USD 5.9) per cylinder. This amounts to an increase that is between 40 per cent to 50 per cent higher than the official price of May 2017. It would effectively mean a removal of the current subsidy. This is a relevant benchmark, as it closely matches the situation of households under the PMUY that have chosen to take out a loan (or EMI) to afford initial connection costs. To pay back the loan, these households are subject to deductions on their DBTL consumption subsidy, effectively requiring them to pay market prices.

In our survey, 50 per cent of households did not use LPG for cooking and therefore were not accessing the subsidy. Out of the remaining 50 per cent using LPG (404 households): 47 per cent of LPG-using households reported that they would absorb higher costs to continue use of LPG, by either reducing expenditure on other goods or increasing income; 39 per cent of LPG-using households reported that they would continue using LPG but cut costs by reducing consumption levels and fuel stacking; and 14 per cent reported that they would stop using LPG and switch back to using biomass such as dung cake or fuelwood (Figure 9).

The share of households who would reduce LPG use (49 per cent) or stop using LPG (23 per cent) was larger among PMUY households (Figure 9). This suggests that the PMUY recipients are more sensitive to price signals on LPG. This may be because they have lower incomes (as evidenced by their eligibility for PMUY) or because they have additional LPG-related expenditure, such as repaying the price of a stove and first refill through higher LPG prices (noting that not all households take out this loan). Requiring households to pay back part of the connection cost—the stove and first refill—through higher LPG prices may be a disincentive for these households to transition to LPG as a primary cooking fuel, due to cost.

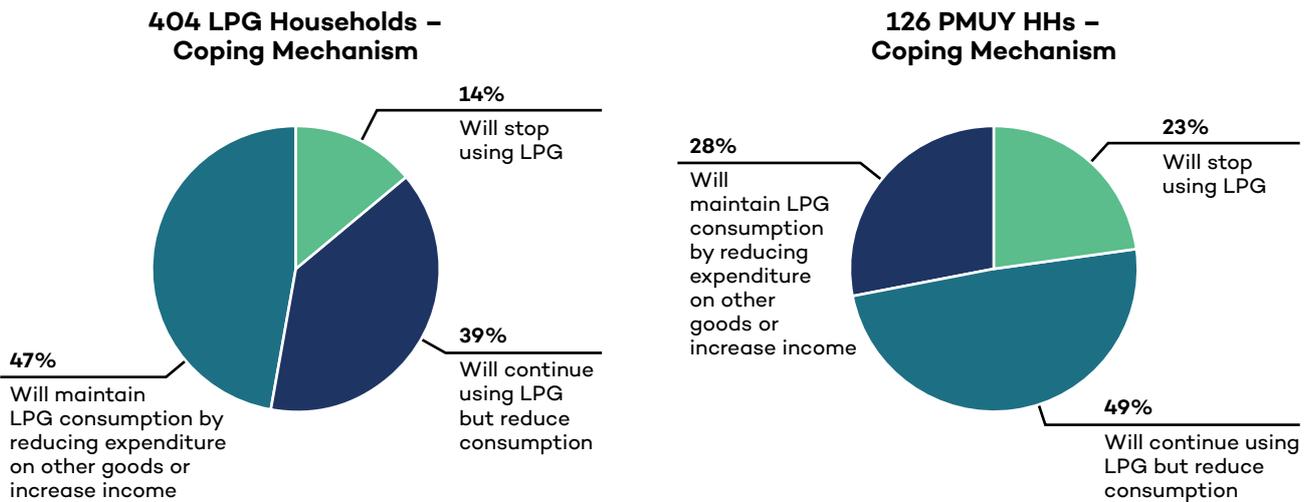


Figure 9. Household response to a price increase in LPG across households using LPG (left) and among PMUY households (right)

Recognizing the challenges with the PMUY loan system, in mid-2018, one of India’s three major OMCs announced that it would defer loan collections from households for their first six refills (Abdi, 2018). Although this may only postpone these problems with affordability, some analysts argue that the approach is justified because as households become accustomed to the higher convenience of LPG over time they will judge that it is in their interests to maintain consumption (Jain et al., 2018). The interaction between age of connection, income and affordability requires further investigation to conclusively substantiate.

4.2.2 Energy Use Effect

Even as access to LPG by poor households has increased, fuel stacking continues among many households. The survey data reveals that for most households, across income groups and urban and rural areas, a combination of fuelwood and LPG is their largest cooking source. Sample households from Ranchi and Raipur are now using on average 344 MJ per month to meet their cooking needs, 45 per cent of this energy is sourced from fuelwood and 39 per cent from LPG (Figure 10). As noted above, households report that this stacking behaviour could be affected by large price shocks, and many low-income households would shift fuel use in the circumstances of a large price change—or, in the case of the PMUY loan system, large deductions in the value of PAHAL (DBTL) fuel subsidies.

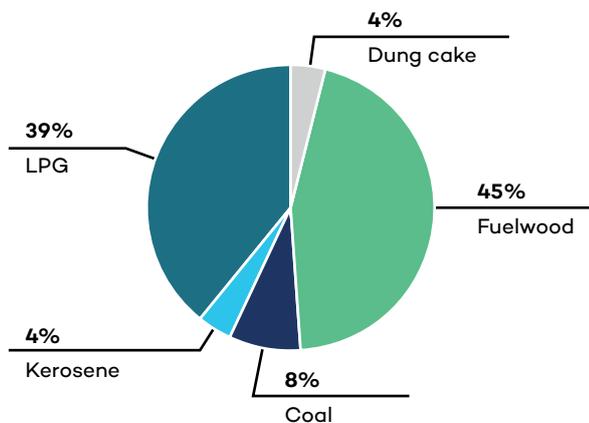


Figure 10. Fuel stacking: Average monthly cooking energy of 344 MJ per household sourced from different fuels for all surveyed households

Source: IRADe survey data, 2017.



The FGDs with women revealed that they used LPG sparingly, because when the cylinder was exhausted they were either unable to arrange the cost of the refill cylinder or for its delivery. In five group discussions (out of 16), women said the lack of doorstep delivery meant the man of the household had to be asked to forego his daily wage and instead make a trip to the LPG distributor to pick up a cylinder. This prompted women to use LPG sparingly and supplement it with biomass fuels even though LPG helped them save time and was a cleaner fuel.

Because of the gendered role of fuel collection, preparation, cooking and utensil cleaning, the survey captured that more women spend time on these activities compared to men. Also, women from households using biomass spent more time in these activities when compared to households using LPG.

- **Time spent on fuel collection and preparation:** Women in FGDs spoke about the drudgery of collecting and preparing biomass. They spoke about the heavy head loads they have to carry and a lack of storage facilities to keep the biomass dry, especially in monsoons. Women also revealed that it was a gendered role, as typically only women and young girls spent time collecting firewood and preparing biomass.
- **Time spent on cooking and utensil cleaning:** 647 households cook two meals a day, while the remaining 163 cook three meals a day. Among households cooking two meals a day, only women cook both meals and the time spent on cooking and cleaning was reported to be lower with LPG than with biomass (see Table 9). Women saved on average about one hour per day due to reduced cooking and cleaning times when using LPG compared to cooking on biomass.

Table 9. Fuel-differentiated per capita cooking and cleaning time for households cooking two meals (minutes)

Fuel used	Morning		Evening	
	Cook	Clean	Cook	Clean
Biomass	77	30	73	28
LPG	49	22	47	23

Source: IRADe survey data, 2017.

The survey found that usage of LPG by a household was associated with women having more time to pursue other activities such as leisure, reading the newspaper, watching television and time with children (see Table 10). Women in households using LPG reported that they spent 20 minutes more on leisure and 10 minutes more on reading the newspaper or spending time with children, as compared to women from households not using any LPG.

While these findings were correlated with LPG usage, they were not necessarily caused by them. This observation could be influenced by several factors, including an association between LPG usage and households having higher household incomes, being in an urban or rural location, or having higher average levels of education.

Table 10. Share of LPG in cooking fuel mix and women's time (in minutes per day)

	Leisure	Reading newspaper/ magazine	Watching television	Time spent with children	Community participation
No LPG (biomass households)	79	20	74	118	35
LPG households	98	24	79	134	38

Source: IRADe survey data, 2017.



Some women in FGDs shared how the acquisition of an LPG connection has empowered them to travel out of their villages for short durations. Because male household members were willing to cook on LPG stoves in the absence of women, but they were not willing to use firewood or cow dung cakes for cooking as it was more work. The survey data also pointed to a similar finding in that males seem more likely to cook if LPG is available: 70 per cent of households having LPG connection said a male member cooked at least one meal in the last 30 days, against the 58 per cent of households who did not have an LPG connection.

4.2.3 Energy Supply Effect

Along with PMUY, to improve the supply and accessibility of LPG, the OMCs aimed to introduce an LPG distributor in each block by 2019 (PIB, 2015). By 2017–18, more LPG distributors were concentrated in the remote and rural remote areas (see Table 11).

Table 11. Increase in LPG distributors, 2014 to 2018

LPG Distributors	FY14	FY15	FY16	FY17	FY18
Urban Distributor	7,172	7,334	7,492	7,677	7,821
Rural Distributor	1,885	2,263	2,852	3,152	3,463
Remote Rural Distributor	4,839	6,333	7,572	7,957	8,862
Total All India	13,896	15,930	17,916	18,786	20,146

Source: PPAC, 2018c.

4.2.4 Differences in Subsidized and Non-Subsidized LPG Prices

The survey found that India's subsidy systems largely seemed to be functioning as intended. Shortages of LPG cylinders were rare: only 6 per cent of households said they had found a shortage of LPG cylinders in the last three months. Most households were also paying the official price for subsidized LPG: between INR 800 to INR 840 (USD11.9 to USD 12.5) per cylinder (14.2 kg), which was the range of the official price at the time of survey in the two districts. Both of these factors suggest that India's subsidy system has succeeded in reducing large-scale diversion of subsidized LPG significant enough to cause shortages and drive up prices through black market sales. This is in stark contrast with subsidized kerosene in Bangladesh, Nigeria and even within India, where leakages, diversion and shortages severely restrict availability and create large time costs and price premiums.

It should be noted, however, that the official price does not include home delivery charges that distributors, particularly rural distributors, may charge. Further, as noted, above, in rural areas it is often not possible to arrange home delivery. In this case, men are largely responsible for collecting LPG cylinders, and households reported that this may require them to forego daily earnings. While this shifts the burden of fuel collection from women to men, freeing up women's time, it creates an added cost for LPG purchase in rural areas that may reduce overall household income benefits and incentives to shift to away from traditional biomass.

4.3 What Subsidies and Government Support Do Poor Women Prefer?

LPG remains the preferred cooking fuel for most households, as the survey found 86 per cent of households preferred cooking on LPG to other fuels. The LPG subsidy, particularly the PMUY, has created several benefits for women. In FGDs, women revealed that they preferred LPG-based cooking because of its welfare benefits related to health and time. "Smokeless cooking" using LPG did not create eye and lung diseases, unlike cooking using biomass. Using LPG also reduced drudgery, as it enabled women to use a lower percentage of biomass in the fuel mix, such as cow dung cake. Women in the FGDs explained that they did not prefer to use cow dung



cake, because they feared it was not hygienic. The reduced use of biomass also reduced time spent cooking and on cleaning utensils, which typically gather black soot because of biomass-based cooking.

Women using LPG shared that they have to rely on biomass when the LPG cylinder is exhausted. Households with a single LPG cylinder connection have to place an order for refill, and in many villages, in the absence of doorstep delivery women have to wait for the man to go to the LPG distributor to pick the cylinder. This creates a delay of a few days that is filled by using biomass for cooking.

Apart from cooking fuels, women expressed dissatisfaction with the wage gap between men and women while working as agricultural labourers. Women in FGDs explained that their working hours were reduced because of childcare responsibilities that limited the time they spent on agriculture fields, but the slightly reduced hours should not create a significant wage gap. At the time of the FGDs, women's daily wage rate was half that of the men.



5.0 Key Findings and Policy Recommendations

The key findings of the research are outlined below, followed by country-specific recommendations, the cross-country finding and the overarching policy recommendations.

5.1 Key Findings

LPG subsidies are working for poor women who can access them. India's recent PMUY connection subsidies have helped bring LPG usage to many low-income households for the first time. India's DBTL (PAHAL) system for administering LPG subsidies does not appear to have created problems regarding shortages and related price premiums to purchase LPG on black markets—which is a problem in many other countries. To the extent that the subsidies influenced increased take-up of LPG, they were associated with benefits for women. These include reduced exposure to harmful indoor air pollution, time savings and reduced drudgery, particularly in rural areas where women were predominantly responsible for biomass collection. Women saved on average about one hour per day due to reduced cooking and cleaning times on LPG compared to cooking on biomass.

Gender-targeting policies may have improved female decision making but may entrench gender roles. As the primary cooks, women are inside more often and exposed to the harmful effects of indoor air pollution from kerosene lighting or biomass stoves. By targeting poor women, PMUY is likely to deliver benefits to women. Our survey found that in 74 per cent of households surveyed, women made decisions on cooking energy sources. Since the PMUY scheme provides only female beneficiaries with subsidies for an LPG connection, it is reasonable to infer that it has placed more decision-making power in the hands of women. Spillover benefits may also occur in terms of improved access to financial services and mobile phones. At the same time, however, aligning policies so closely with one gender could further reinforce existing gender roles around cooking.

Poor distribution networks in rural areas could create a new time burden for men, with potential negative effects on earnings. In rural areas, LPG collection was predominantly the responsibility of men. LPG is not delivered at the house and has to be collected from the LPG distributor.

More than half of surveyed households in the states of Chhattisgarh and Jharkhand did not use LPG. These poor households had therefore not yet benefited from the PMUY. This may be due to three reasons: the costs of LPG connections or cylinder refills are too high for some households; unavailability of LPG locally; or failure of some poor households to be eligible for LPG subsidies. PMUY is based on targeting through data from the SECC-2011, which several experts consider might be unreliable or incomplete, with many errors. Affordability appears to be an issue given that 43 per cent of households that use LPG said they would reduce or cease LPG use given a 50 per cent price rise. At the same time LPG is competing with 'free' biomass fuels where women's time spent collecting and preparing wood fuel or dung cake is not valued.

Long-standing issues with the targeting of India's PAHAL (DBTL) consumption subsidies have not been addressed. The most important of these is the large share of high-income households who continue to benefit from the PAHAL (DBTL) consumption subsidy. PAHAL (DBTL) subsidies in 2018 were estimated at INR 209 billion (USD 3.3 billion), more than eight times the volume allocated to the PMUY at INR 25 billion (USD 0.4 billion). The survey found that among PAHAL (DBTL) recipients, 48 per cent did not have BPL cards.

Figure 11 summarizes the key findings in terms of income, energy use and energy supply effects.



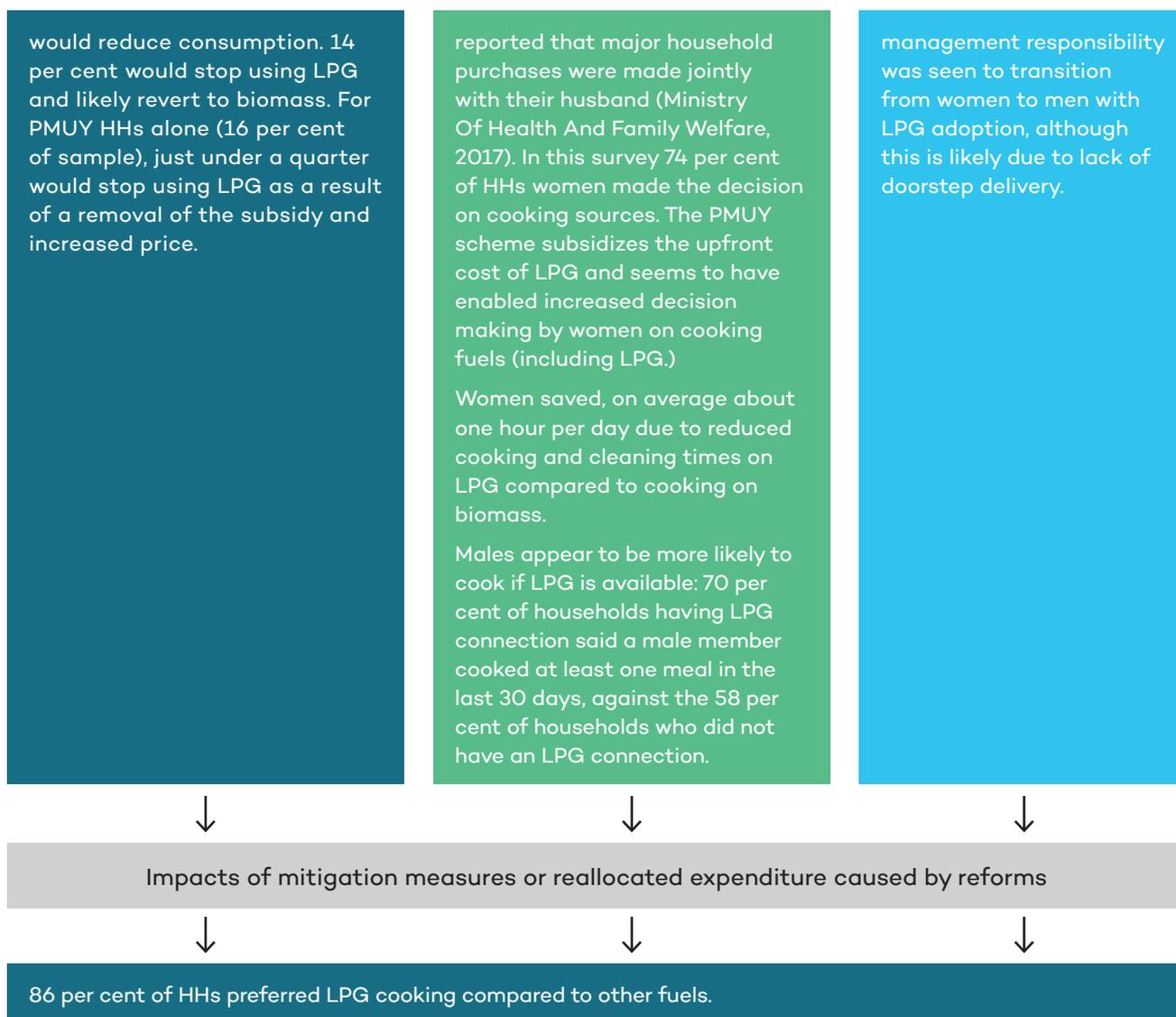


Figure 11. Summarized findings from the impacts of fossil fuel subsidies, their reform and mitigation on poor women in India

Source: This research, unless otherwise sourced.

5.2 Policy Recommendations for India

Better targeting of LPG subsidies is needed. Many non-poor households with access to a BPL card continue to access LPG subsidies. In our sample, 50 per cent of households did not use LPG and are therefore not in receipt of LPG subsidies, either via PAHAL nor PMUY. The majority of people benefiting from ongoing PAHAL (DBTL) consumption subsidies are higher-income consumers. Large and inefficient PAHAL (DBTL) subsidies continue to represent a significant opportunity cost that could be better targeted to supplementing energy access needs of poor households. In 2018, PAHAL (DBTL) subsidies were more than eight times the value of PMUY subsidies. PMUY is based on targeting through data from the SECC-2011, which several experts consider might be unreliable or incomplete, with many errors. Among surveyed households, only 48 per cent of PMUY beneficiaries were among the poorest 40 per cent of households. Further, the PMUY currently includes an optional loan system that may create serious affordability problems for the poorest.



Review subsidies to ensure the poorest can afford a new connection. Ongoing costs of LPG consumption are an important factor in determining household cooking choices. This being the case, it is important to revisit the design of the current PMUY loan scheme, where households must pay back a loan for their first stove and refill through deductions on their consumption subsidy (PAHAL [DBTL]) until the loan is fully repaid—effectively increasing refill prices during the loan payback period. This policy design is in opposition to the policy’s energy access ambitions, actually decreasing affordability for the poorest in the short term. Being asked to pay bribes for a connection would also reduce affordability. This practice needs to be investigated and eliminated.

Subsidy reform needs to be undertaken with care to avoid negative energy access impacts. As the government considers opportunities to reform LPG subsidies through price changes, care needs to be taken to mitigate the impact on poor households. When asked to imagine a scenario where prices increased by 40–50 per cent, 47 per cent of households using LPG reported that they would maintain current levels of LPG consumption by reducing expenditure elsewhere or increasing income, while 39 per cent reported that they would continue to use LPG but reduce consumption; 14 per cent of households using LPG said they would stop consumption and revert to biomass.

Improve education and alternative clean cooking options. Efforts by OMCs to decrease diversion and to increase the networks of LPG distributors in rural and remote areas have been key to increasing access to LPG. Factors such as education also seem to play an important role in the choice of cooking fuel. The extent of India’s commitment to promote LPG has been admirable—but it has also arguably crowded out resources for a more holistic strategy for clean cooking (for example toward electricity, biogas, solar and cleaner cook stoves), which should ideally include efforts to overcome non-price factors influencing access, as well as promoting the development of non-fossil fuel-cooking technologies for the medium term. This is another area where the large extent of inefficient expenditure on LPG consumption subsidies represents a large opportunity cost. India’s draft National Energy Plan recognizes the need for a National Cooking Mission to address clean cooking more holistically.

5.3 Core Findings From Multi-Country Study

The findings from the other two country studies are broadly consistent with those found for India. The detailed results from the studies of Bangladesh (kerosene for lighting) and Nigeria (kerosene for cooking) are available in Global Subsidies Initiative-IISD, BIDS, IRADe and Spaces for Change (2019). This section provides a summary of the key findings.

Energy subsidies are helping some but not all poor women. In Nigeria, biomass accounted for 64 per cent of cooking fuels, with only the minority using kerosene. Households reported kerosene prices that were between two and six times the official sales price. Fuel distribution was unreliable, and characterized by smuggling, inefficiencies and corruption. During periods of kerosene scarcity, women would often queue at distributors for hours.

In Bangladesh, kerosene subsidies are not being passed on to consumers. Bangladeshi householders surveyed were generally not aware of subsidies or the government’s official price for kerosene. In the areas surveyed kerosene prices were on average 14 per cent higher than the official price.

Cooking is a gendered role, and women still do most of the cooking in the areas surveyed. In Nigeria, in both urban and rural areas, women are primarily responsible for cooking with kerosene and a host of other cooking fuels. Women are in charge of cooking in 85 per cent of households in Lagos and in 88 per cent of households in Imo.



In Bangladesh, the survey found it is generally only women who cook, and they reported spending 80 minutes every day cooking. Only nine men reported being engaged in cooking in the survey of 630 households in Bangladesh.

Subsidies can increase fuel scarcity that can lead to long queuing for fuels, and this burden often falls on women (e.g., Nigeria). The informal sector in Bangladesh and Nigeria is key to accessing kerosene in small, but more expensive, amounts than via official channels, and reforms need to plan for impacts in the informal sector.

Women spend time fetching fuel and save time when there is fuel switching. In Nigeria, during periods of scarcity women mostly queue at the filling stations to buy kerosene cooking fuel, taking more than 30 minutes to get to a kerosene dealer. In rural Imo, a third of respondents needed over 30 minutes to collect the firewood. Nigeria, both in Lagos and Imo, most women in FGDs stated that switching to a preferred cooking fuel would enable them to save time spent on cooking. Most women in a focus group discussion in Lagos said they would spend the extra time (from fuel switching to a cleaner fuel) on their place of work or business, while women in Imo stated that they would use this time to do more cooking or spend more time with their family and children.

This effect seems stronger in rural areas where households have access to “free” energy like biomass. For example, 18 per cent of households in Lagos, Nigeria and 51 per cent of households in Imo State, Nigeria, stated that they would use more biomass to cope with price increases.

Subsidy reform needs to be undertaken with care. Cost is an important factor influencing fuel choices, and prices need to reflect ability to pay for the poorest if a switch from biomass is to occur. A price increase in cooking fuels could impact women adversely in terms of greater time spent searching for biomass as well as health impacts. While only 18 per cent of households in Lagos, Nigeria, reported switching to or using more biomass, over 50 per cent of rural households would employ this strategy, particularly the poorest. The higher cost of kerosene reduced available household income, especially women’s budgets.

In Bangladesh, around half of the households surveyed said they would absorb a hypothetical 20 per cent price increase and half would reduce the use of kerosene. Given a potential doubling of the price of kerosene, two-thirds of households would reduce their use of the fuel as well as other strategies, such as reducing expenditure on other goods (e.g., food). In the case of a price shock, 74 per cent of households reported that all household members would be equally affected.

Different genders are in charge of decision making around fuel and lighting choices in different countries. In Bangladesh, our survey found that it was overwhelmingly men who take decisions on energy sources for lighting and cooking. In Nigeria, a large majority of the women surveyed reported being in charge of making decisions about energy sources for cooking. In Nigeria, about half of households indicated that men purchase and own electronic appliances, while only one fifth are purchased and owned by women. This implies that men have an important role in choosing appliances that might have gendered implications for energy use.

Investing in fuels rather than outcomes may be hindering more effective options. The large sums invested in subsidizing one fuel could be used more efficiently to support economic and social empowerment. “Picking winners” with fuel subsidies can crowd out effective policy alternatives such as addressing non-price barriers (distribution, price competition) or innovative solutions (such as solar products for lighting and cooking, or biogas for cooking). In Bangladesh, women expressed a preference for support in the form of electricity access or food subsidies. In Nigeria, women indicated their preference for support with jobs, health, education and the general cost of living. There is therefore a large potential to improve the effectiveness of social programs to empower women.



5.4 Cross-Country Policy Recommendations

In terms of broad policy recommendations to governments, this research suggests that governments could

- Continue to phase out fossil fuel subsidies that do not support energy access for poor women or the target population. In particular, there is a need to phase out subsidies for kerosene (which is prone to large-scale diversion, more costly than other lighting alternatives and not clean-burning) while also ensuring there is a clean alternative.
- Work to better target subsidies for fuels that are currently deemed necessary for sustainable energy access so more resources are available to efficiently help achieve SDG7 on energy access and to fund programs that support women and promote gender empowerment.
- Make energy access support more technology-neutral, to achieve better outcomes and avoid technology lock-in by fostering solutions adapted to the context. This should include not only focusing access policies on transitional fossil fuels but also on ensuring that the right market incentives and structures are in place to cultivate new and renewable lighting and cooking technologies.
- Consider alternative support policies such as social safety nets, health care, education or business loans for women.
- Recognize that subsidy reform needs to be undertaken extremely carefully, based on an impact analysis that accounts for the effects on women and alongside robust package of measures to mitigate against potential negative impacts of price increases.
- Use comprehensive strategies for energy access that recognize the importance of gender and incorporate it into policy design.



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