

Report on Evaluation of the Scheme for Kerosene Free Delhi



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C-80, Shivalik, Malviya Nagar

New Delhi – 110 017

India

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Project Team

Dr. Jyoti Parikh, Executive Director, IRADe

Mr. Chandrasekhar

Ms. Gayatri Khedkar

Ms. Riya Rahiman

Ms. Mani Dhingra

Mr Rajat Puri

Preface

The **Ministry of Petroleum & Natural Gas (MoPNG)** ‘**Vision - 2015 for Consumer satisfaction and beyond**’ proposed switching over from kerosene to LPG in all towns with more than 0.5 million population in a phased manner, beginning with the metro cities. Government of Delhi took a step forward to implement the MoPNG vision and launched the “**Kerosene Free Delhi**” scheme on 21st August 2012.

The “Kerosene Free Delhi” scheme was launched in collaboration with three Oil marketing companies (BPCL, HPCL and IOCL) and Union Ministry of Petroleum and Natural Gas. Under the scheme, free gas connections along with LPG filled cylinders, two burner gas stove, regulator and *Suraksha* (safety) pipe were issued to the Jhuggi Ration Card (JRC), Below Poverty Line (BPL) and Antodaya Ann Yojana (AAY) ration card holders who were using kerosene oil for cooking.

Primary surveys were conducted for the direct beneficiaries under the scheme to understand the pattern of kerosene consumption and issues faced before the launch of the scheme, level of awareness generated and procedure undertaken by the beneficiary during implementation of the scheme, current state of LPG consumption, pattern of expenditure of household on cooking fuel and satisfaction with the overall scheme. **The evaluation study undertaken by IRADe reveals that the KFD scheme had successfully improved the lives of the beneficiaries in NCT of Delhi in terms of social and environmental benefits. Time saved in cooking was most frequently reported non-monetary benefit by the respondents. On an average, 2 hours per week is found to be saved by women households with the introduction of LPG as the cooking fuel.** Further, the study shows a great potential to replicate the scheme in other major Indian cities as well as rural areas. This will ensure an improved quality of life and health conditions of poor households.

We hope this report will serve as a valuable resource for all the policy makers, organizations, institutions, agencies and individuals working for making India Kerosene Free Country.

Dr. Jyoti Parikh
Executive Director, IRADe

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Abbreviations

LPG	Liquefied Petroleum Gas
PNG	Piped Natural Gas
MoPNG	Ministry of Petroleum and Natural Gas
KFD	Kerosene Free Delhi
JRC	Jhuggi Ration Card
BPL	Below Poverty Line
AAAY	Antodaya Anna Yojna
APL	Above Poverty Line
NCT	National Capital Territory
GNCT	Government of National Capital Territory
OMC	Oil Marketing Companies
NOC	No Objection Certificates
PDS	Public Distribution System
w.e.f.	with effect from
Rs.	Indian Rupees
km ²	Square Kilometres
NSSO	National Sample Survey Organisation
SKO	Superior Kerosene Oil
FSO	Food and Supply Office
HPCL	Hindustan Petroleum Corporation Limited
BPCL	Bharat Petroleum Corporation Limited
IOCL	Indian Oil Corporation Limited
KOD	Kerosene Oil Depot
SBC	Single Bottled Connection
DBC	Double Bottled Connection
MTRA	Mumbai Thane Rationing Area
NIC	National Informatics Centre
MLA	Member of Legislative Assembly

1. Introduction

Globally, over 2.6 billion people have no access to modern energy source for cooking and they rely on the traditional fuels such as biomass, animal waste and kerosene for cooking which causes harmful indoor air pollution. (International Energy Agency: World Energy Outlook, 2013). It is overwhelming to note that one fourth of the world population does not have access to clean energy which further limits them from a better quality of life. The majority of this population is spread across the South Asian and Sub Sahara African regions.

In India 70 % of the households are dependent on traditional cooking fuels like firewood, crop residues, cow dung, coal and kerosene. Among them firewood is the predominant household cooking fuel source having a percentage share of 49% in the country. The clean and modern cooking fuel LPG/PNG is the second largest household cooking fuel source with a share of 28.5%. Solid fuel sources such as crop residue and cow dung cakes contribute to 9% and 8% respectively in the total household cooking fuel sources. Kerosene as a cooking fuel occupies a share of 2.9 %. Other cooking fuel sources like coal, electricity, biogas and other contributes a very small percentage share in household cooking fuel source (figure 1).

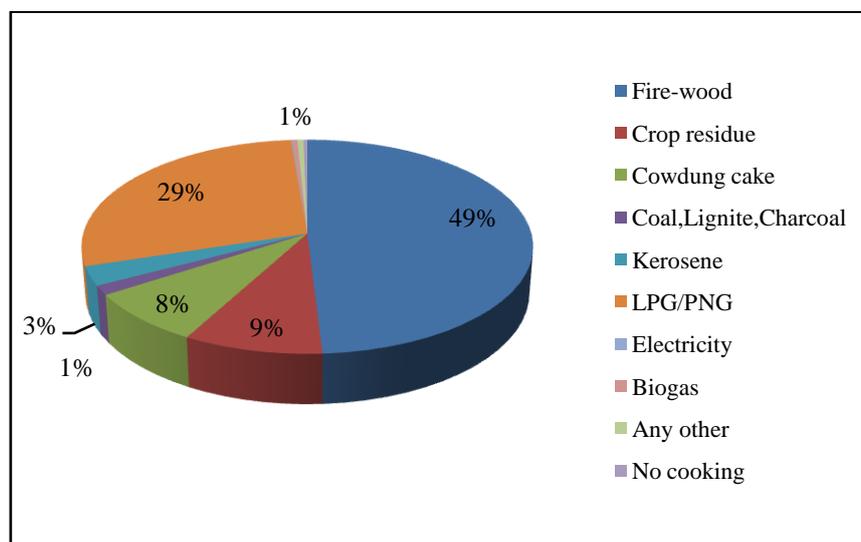


Figure 1: Percentage Share of Households by Type of Cooking Fuel – India (Total):2011
Source: (Census, 2011)

Solid cooking fuel sources such as firewood, cow dung cake, crop residue, etc. are the main energy sources in the rural India. However, urban India depicts a different picture. 65% of urban households are using clean cooking fuels such as LPG and PNG. LPG is the predominant cooking fuel in urban India. Kerosene is the second most important cooking fuel among urban areas constituting approximately 7.5% of total urban households. Traditional

cooking fuels such as firewood, crop residue and cow dung cakes are used by a smaller section of urban households. (Figure 2).

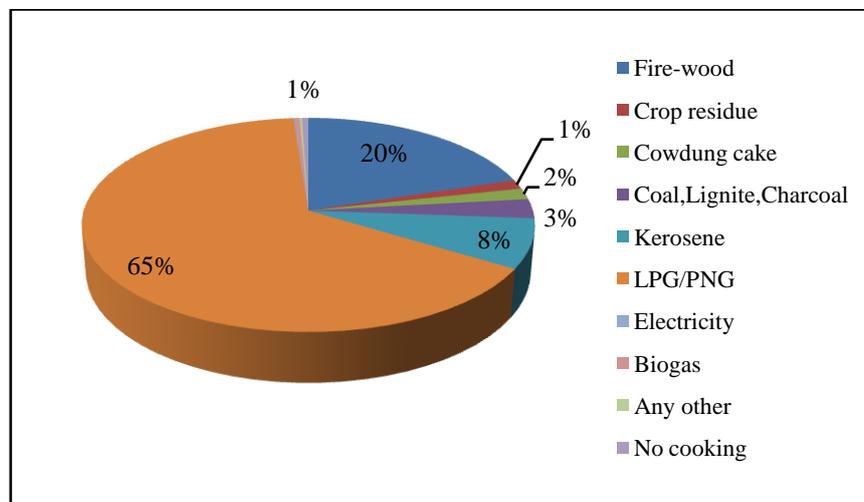


Figure 2 Percentage Share of Households by type of Cooking Fuel - India (Urban):2011
Source: (Census, 2011)

Kerosene is not a cleaner cooking fuel as compared to LPG. It is a dirty fuel and results in indoor air pollution, which adversely affects the health especially of women and children. Kerosene is also time consuming to cook with as compared to LPG because it takes more time for the food to cook and for the utensils to be cleaned due to soot deposition. A better access to clean cooking fuel among the urban poor would not only improve their quality of life but would also reduce the burden of cooking fuel subsidies on the Government.

It is essential that the intended poor beneficiaries should enjoy the benefits of LPG which is comparatively a modern and cleaner cooking fuel. Hence, it is imperative that schemes which encourage the switch from highly polluting cooking fuels to cleaner and modern fuels such as LPG/PNG be studied.

In the year 2009, The Ministry of Petroleum & Natural Gas (MoPNG) published its oil sector Vision - 2015 for 'Consumer Satisfaction and Beyond' whereby switchover from kerosene to LPG in all towns with more than 0.5 million population in a phased manner was proposed, beginning with the metros. As a result of this, Delhi's kerosene oil allocation (sold under PDS) was reduced by 20% in 2011-12 and further by 67% in 2012-13. Subsequently in August 2012, Kerosene Free Delhi (KFD) scheme was launched by government of Delhi and kerosene distribution under PDS stopped completely in the entire capital territory. Under this scheme one LPG filled cylinder along with two burner gas stove, regulator and Safety

(Suraksha) pipe were issued free of cost to the Jhuggi Ration Card (JRC), Below Poverty Line (BPL) and Antodaya Ann Yojana (AAY) ration card holders who were using PDS kerosene oil for cooking. The scheme was intended to provide 356 thousand poor households with the initial capital support system in terms of free LPG connection and upfront costs, to switch to LPG as a cooking fuel. The households were required to pay for subsequent purchases of LPG cylinders.

Delhi has a total of 356 thousand ration card holders (ePDS database of government of Delhi) entitled for getting subsidized PDS kerosene. Before the introduction of Kerosene Free Delhi (KFD) scheme, Delhi was getting 53,000 Kilolitres kerosene oil every year from the centre which was sold to the households having ration card at subsidized rate (The Hindu, June, 17, 2014). This implies that each ration card holder household in Delhi was entitled to get 149 Litres of kerosene oil every year. The subsidy on kerosene at Rs. 34.80 per litre amounts to a cost of Rs 5,181 per annum per household. However, assuming a quota of 9 subsidized LPG cylinders per annum per household (which would be sufficient to meet the household cooking fuel requirement for a month) would entail a cost of Rs 4,699 at the rate of Rs. 522.10 of subsidy per cylinder. Therefore, the shift from kerosene to LPG could result in financial saving of around Rs. 482 per household beneficiary per annum to the government.

This study undertaken by IRADe aims to evaluate the “Kerosene Free Delhi” scheme launched by the Government of Delhi. The broad objectives are the following:

1. To document the “Kerosene Free Delhi” scheme launched in NCT of Delhi in 2012.
2. To evaluate the accessibility and effectiveness of the scheme in terms of its welfare impact on intended beneficiaries as well as the issues faced during and after the implementation of the scheme.
3. To assess the scope for replication of this scheme by other State Governments.

1.1.Launch of KFD Scheme

“Kerosene Free Delhi” scheme was launched by the Government of Delhi to make Delhi as the first kerosene free city in the country by providing LPG connections to all the households who use Kerosene as the predominant cooking fuel. The government decided to cover all those who had AAY/BPL/JRC ration cards and were using kerosene for cooking as eligible beneficiaries under the scheme. Delhi is also experiencing a huge influx of migratory population coming and settling down in the city, especially in the slum areas from other parts

of the country for better employment and business prospect. These sets of households also use kerosene and firewood for cooking but they were not covered in the scheme.

The Food & Supplies Department was the nodal government agency which was entrusted to launch and monitor the scheme. At the onset of the scheme, the department invited applications from the eligible households, followed by verifications and distribution of LPG kits under a procedure outlined in(Figure 3).

In the financial year 2012-13, Government incurred an expenditure of Rs 248.60 million to provide LPG kit to 81 thousand eligible household beneficiaries. An expenditure of Rs. 3,049 per household (Rs 1,250 –Security deposit for the cylinder, Rs 150 Security deposit for regulator, Rs 1,200 for gas stove &Surakhsha pipe, Rs 60 for blue book & other papers and Rs 399 for the cost of filling cylinder) was incurred against the planned expenditure of Rs. 2000. A total budgetary outlay of Rs. 400 million was allocated from the Delhi Government annual budgetary plan 2013-14 towards the implementation of KFD scheme. Delhi Government further planned to release additional 189 thousand LPG gas connections till July 2013 and planned to declare Delhi as the first Kerosene free city by October, 2013 whereas actual disbursement was only 112 thousand additional households and hence, bringing the total to 193 thousand household beneficiaries under the KFD scheme.

Assembly Speech by Mrs. Sheila Dixit in
Delhi Budget 2012-2013

“Sir, as per Census 2011, in Delhi about 175 thousand households (5.3 percent of the total households) rely on kerosene for cooking. Government has decided to provide onetime cash subsidy of Rs.2000 to all these households for obtaining an LPG connection and purchase of a gas stove. I propose to provide Rs.400million in the current financial year, so that we may declare Delhi as the first kerosene free city in the country with all households having LPG connections. This would be another milestone in our efforts to improve the quality of life in Delhi. We hope to secure the support of Government of India in this endeavour.”

(Source: Budget, Government of Delhi 2012-13)

1.2.Implementation Procedure

The “Kerosene Free Delhi” scheme was launched in collaboration with three Oil marketing companies (BPCL, HPCL and IOCL) and Union Ministry of Petroleum and Natural Gas (MoPNG). To provide LPG connections under the scheme, Food and Supply Department, Government of Delhi, invited applications from the eligible households along with a copy of

their ration card and Aadhar card. The Aadhar card was seeded online in the database and the application was verified, recommended and forwarded to the designated Oil Marketing Company (OMC). The complete procedure follow up to get an LPG connection by an eligible household as per the official circular is as follows:-

i. The ration card holders (AAY/BPL/JRC) who were kerosene users approached the concerned circle office of Food and Supplies Department with their documents i.e ration card, identity proof (like UID, voter id) and residence proof (like electricity bill, water bill).

ii. The circle officer checked and verified the original documents and attested the copies as a token of verification.

iii. The respective circle officer would ensure that the connection would be released in the name of the head of the family as reflected in the ration card. Thereafter he/she would enter the complete details of the card holders in the prescribed online form at the NIC(National Informatics Centre) server data base by using his login ID and password.

iv. After filling the complete details, the circle FSO would save and take a print out of the duly filled form, would obtain the signature of the applicant on it and the acknowledgement slip would be given to the applicant. Thereafter the circle FSO would forward this computer generated application of the beneficiary to the office of the concerned Assistant commissioner online as well as physically.

v. The Assistant Commissioner would sign a duly filled form for approval of the same in the NIC server data base by using his login ID and would forward the form online to the State-Level-Coordinator (Oil Industry) of Delhi after generating a forwarding letter from the system.

vi. The State-level-Coordinator would select any of the three companies (IOCL/BPCL/HPCL) as per the policy of the MoPNG and would forward the application online to the respective oil company and would inform the Assistant Commissioner. Thereafter he would generate the letter in the name of the respective oil company and would forward the same to them by enclosing application physically.

vii. The respective oil companies (IOCL/BPCL/HPCL) would first allot any of the area distributors to the list of the beneficiaries who are located within their service radius and then would forward the online application of the beneficiary to the concerned distributors.

viii. The concerned distributors would contact the beneficiary, would complete all the requisite formalities and would issue the LPG connection (i.e. LPG filled cylinder, regulator, rubber pipe, 2 burner gas stove and a blue book etc.) to the beneficiary. After releasing the

connection, the distributor would submit the bill of the LPG connection to their respective oil companies.

ix. For bringing transparency, Assistant Commissioner would coordinate with the area M.L.A, FSO, (Food and Supply Office) concerned Oil Company and distributor on each and every issue and would organize at least one event in each Circle in consultation with M.L.A for distribution of LPG connection.

x. The oil companies would then send the consolidated bill of the beneficiaries to whom the connections were issued to the fuel branch through the SLC (State Level Coordinator) along with relevant documents in original.

xi. The circle inspector would also verify that those BPL/AAY/JRC Kerosene Oil Card Holders who had applied to LPG connection have got the connection and would send the monthly status report to the concerned Assistant Commissioner's office. The oil companies would also ensure that LPG connection may not be issued to them who already held LPG connection.

xii. The assistant commissioner would send the consolidated report of their circles to the fuel branch on a weekly basis so that the same may be sent to the Planning & Finance department of NCT of Delhi.

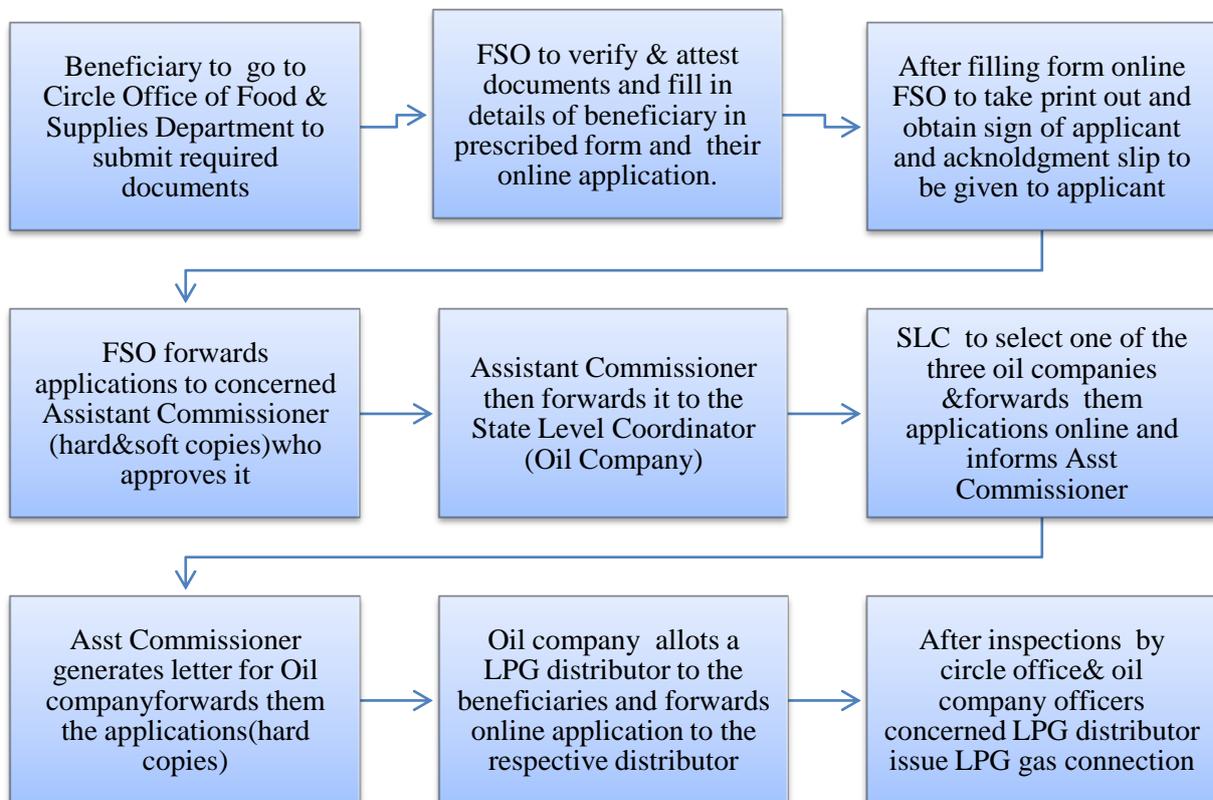


Figure 3: Procedure for availing new LPG connection under KFD Scheme

1.3.Fuel Subsidy

In India, in order to protect domestic consumers, especially the poor from the vagaries of international markets and to improve energy access, subsidies for four petroleum products, namely petrol, diesel, kerosene and LPG were provided by the government. Subsidy was removed on petrol in September 2011 and on diesel in October 2014. However, kerosene and domestic LPG (sold to the customers of public sector companies such as IOCL, HPCL and BPCL) are subsidized and still sold at a lesser price than the cost of supply. This results into “Under Recoveries” for the Oil Marketing Companies (OMCs). The entire under-recoveries is not borne by the OMCs- a part of it is compensated by additional cash assistance from the government, while another portion is covered by financial assistance from upstream National Oil Companies (NOCs) such as ONGC (Figure 4).

The total subsidy on kerosene has increased manifold in the last decade; though the subsidy payouts share of the central government is kept fixed at Rs. 0.82 per litre from 2004-05. The balance of the subsidy share from 2004-05 onwards are borne by the public sector oil companies. Similar subsidy burden sharing arrangements is also followed for LPG where the central government subsidy share is kept constant at Rs. 22.58 per cylinder from 2004-05 and balance of the subsidy is borne by public sector oil companies (Table 1).

Table 1 Subsidy on PDS kerosene and Domestic LPG from 2002-2003 to 2013-2014

Year	PDS Kerosene (/Litre)			Domestic LPG (/Cylinder)		
	From Central Government Budget	By Public Sector Oil Companies	Total Subsidy	From Central Government Budget	By Public Sector Oil Companies	Total Subsidy
2002-03	2.45	1.69	4.14	67.75	62.27	130.02
2003-04	1.65	3.12	4.77	45.18	89.54	134.72
2004-05	0.82	7.96	8.78	22.58	124.89	147.47
2005-06	0.82	12.1	12.92	22.58	152.46	175.04
2006-07	0.82	15.17	15.99	22.58	156.08	178.66
2007-08	0.82	16.23	17.05	22.58	214.05	236.63
2008-09	0.82	24.06	24.88	22.58	234.88	257.46
2009-10	0.82	14.85	15.67	22.58	178.13	200.71
2010-11	0.82	17.39	18.21	22.58	249.94	272.52
2011-12	0.82	26.46	27.28	22.58	320.3	342.88
2012-13	0.82	31.16	31.98	22.58	427.14	449.72
2013-14	0.82	33.98	34.80	22.58	499.52	522.1

Source: MoPNG data from <http://www.indiastat.com/>

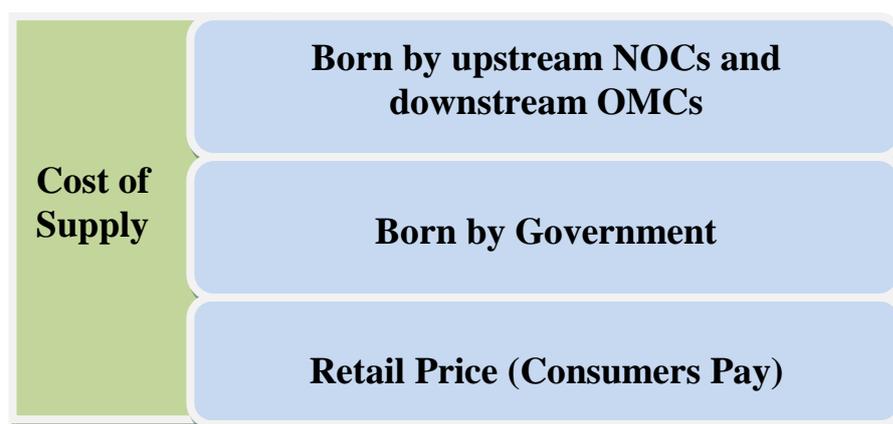


Figure 4: Cost of Supply sharing for Oil and gas in India

The very effectiveness of the fuel subsidies lay in the extent to which it reaches the poor population. These subsidies are not targeted and available to all. Subsidized kerosene is available through the Public Distribution System (PDS). However, many a times it does not reach the intended beneficiaries. Often it is diverted into the black market where it is sold to the customers at higher prices or mixed as an adulterant with automotive fuels like diesel (NCAER, 2005).

As per the Economic Survey 2012-13, the distribution of LPG subsidies within the poor and rich is highly inequitable with only around 8.2% of the subsidies reaching the poorest quintile in urban areas. This shows less reach of the subsidies on LPG to poorer households. Hence, the high pilferage in kerosene and LPG subsidy are forcing the Government to find out a suitable subsidy transfer mechanism to reach the beneficiaries equitably.

In order to evaluate the scheme it is essential to understand the monetary implications attached to this scheme. Considering the total allocation of kerosene by the Central Government to Delhi to be sold at subsidized price household consumption of a total of Rs. 1,844.40 million per year would have been the cost incurred on subsidies on PDS kerosene. However in addition a onetime cost of Rs 590 million, the total subsidy incurred on LPG under the scheme is estimated to be Rs. 1,673 million per annum; considering a provision for 9 LPG cylinders per connection per year (Table 1). This further indicates an estimated saving of Rs. 172 million in subsidies in a year. The onetime cost of conversion of households from kerosene to LPG is recovered in approximately 3.5 years in the form of subsidy saving. (Table 2)

Table 2 Savings in terms of subsidy per year -shift from Kerosene to LPG as cooking fuel in Delhi

Total Number of eligible Households covered under the scheme (in '000) (a)	Total Number of Households converted to LPG from Kerosene (in '000) (b)	Onetime cost in providing LPG to converted households @ Rs. 3,049 per household (in Million Rs) (c = b X Rs 3,049)	Total PDS Kerosene Consumption in Delhi (in '000 Litres) (d)	Kerosene Subsidy @Rs.34.80/Litre (in Million Rs) (e= d X 34.80)	Subsidy on 9 cylinders of LPG per year for household @ Rs 522.10 subsidy per cylinder (in Million Rs) (f = a X 522.10 X 9)	Net Subsidy redeemed per year by providing LPG to Kerosene user households (in Million Rs) (g= e - f)
356	193	590	53,000	1,844	1,673	172

Note: Government received 2, 14,149 applications for free gas connection under the scheme, of which 20,732 were, rejected (The Hindu, June, 17, 2014). As per the scheme guidelines, families already having LPG connections were not eligible and hence, their applications were rejected.

2. Urban Context of Delhi

Delhi is the capital of India. The entire metropolitan region of Delhi is known as National Capital Territory of Delhi after attaining partial statehood in 1993. NCT of Delhi is a landlocked state with Haryana in the west and Uttar Pradesh in the east. It is the largest urban agglomeration in India by land area and population. NCT area covers around 1,483 km² of which 783 km² is rural and 700 km² is an urban area. Currently there are 11 districts and 33 subdivisions in NCT. As per Census 2011, population of NCT Delhi on 1st March 2011 was 16.75 million. Census recorded 135 urbanized villages and 110 census towns in NCT of Delhi. Delhi shared 1.38% of India's total population in 2011 and accounts for about 0.05% of India's geographical area. Figure 5 shows the nine districts and district wise population of Delhi based on Census 2011. Distribution of population across the districts is uneven in Delhi. More than 53% population in Delhi is recorded in 3 districts viz. North West, South and West in 2011.

2.1. Urban Poor in Delhi

Poverty is a multifaceted term and the methodology to identify the poor households has also evolved over time. It not only includes deprivation in income but also other factors like illiteracy, malnutrition, mortality, morbidity, access to water and sanitation, vulnerability to socioeconomic stresses, etc. The households in Delhi have been divided into 4 categories based on their income and are provided with an appropriate ration card category for the supply of essential food items and commodities at a subsidized price from the government ration shop; the four types of household ration cards are 1. Below Poverty Line (BPL), 2. Antyodaya Anna Yojana (AAY), 3. Jhuggi Ration Card (JRC), and 4. Above Poverty Line (APL).

Below poverty line is an economic benchmark used by the Government of India to identify households below the threshold of poverty. BPL is based on various factors and varies for each state. BPL families have total income up to or below the state specific poverty line. State specific poverty line for Delhi for 2011-12 was Rs. 1,134 monthly per capita expenditure on consumption in urban areas (Planning Commission, July 2013). AAY covers poorest of poor households of Delhi. JRCs are allocated to households in Jhuggi Clusters of Delhi. Based on the NSSO 68th round which follows Tendulkar Methodology (Planning Commission, 2009) for 2011-12, the total number of people below the poverty line was estimated to be 1.696

million in NCT of Delhi, which accounts for 9.91% of the total population of the state (Planning Commission, July 2013).

A Slum, for the purpose of the Census, has been defined as residential areas where dwellings are unfit for human habitation by reasons of dilapidation, overcrowding, faulty arrangements and design of such buildings, narrowness or faulty arrangement of street, lack of ventilation, light, or sanitation facilities or any combination of these factors which are detrimental to the safety and health. According to Census 2011, 3,163,430 persons were residing in slums of Delhi with 383,609 households. This accounts for 19% of the total population and 11% of total households in Delhi. (Census, 2011).

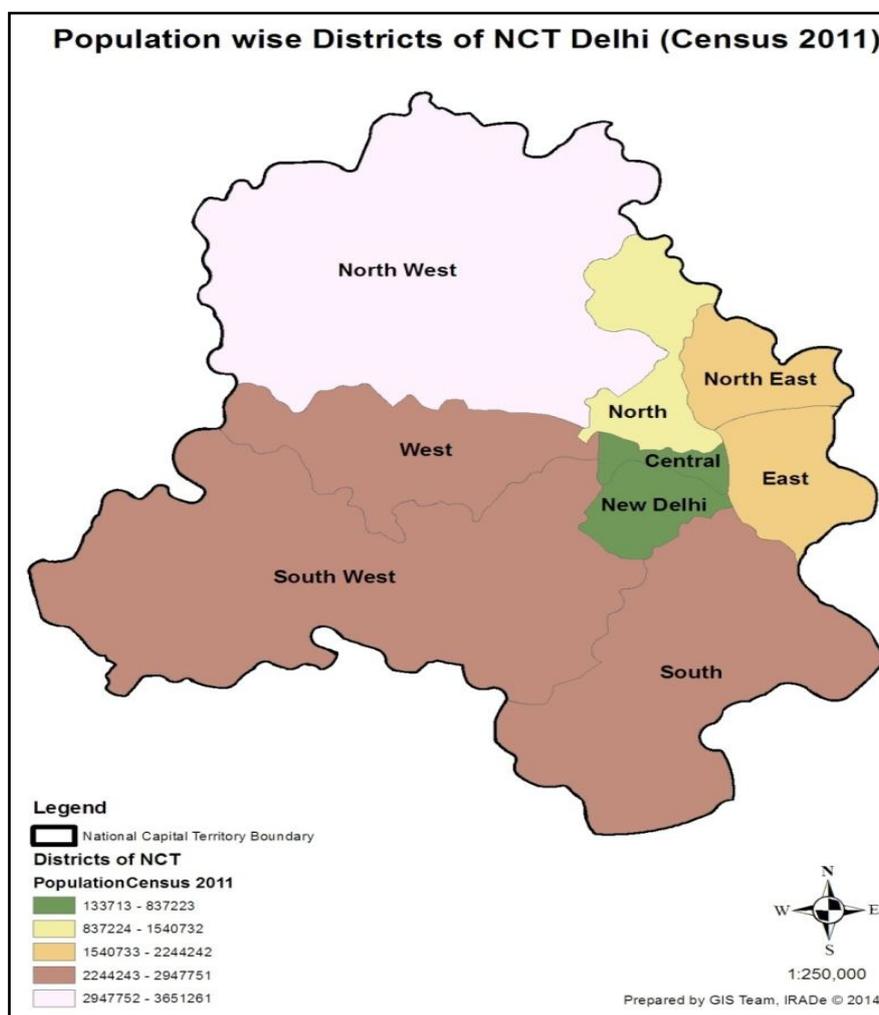


Figure 5: Map of Delhi

2.2. Cooking Fuel Pattern in Delhi

In Delhi, PDS comprises network of Fair Price Shops (FPS) and Kerosene Oil Depots (KOD) for availing specific articles at controlled prices through ration cards especially by poor

households. In 2011-12, 2,361 licensed shops for kerosene and 356,395 kerosene users as per ePDS database reports were recorded in Delhi. (Economic Survey, 2012-13)

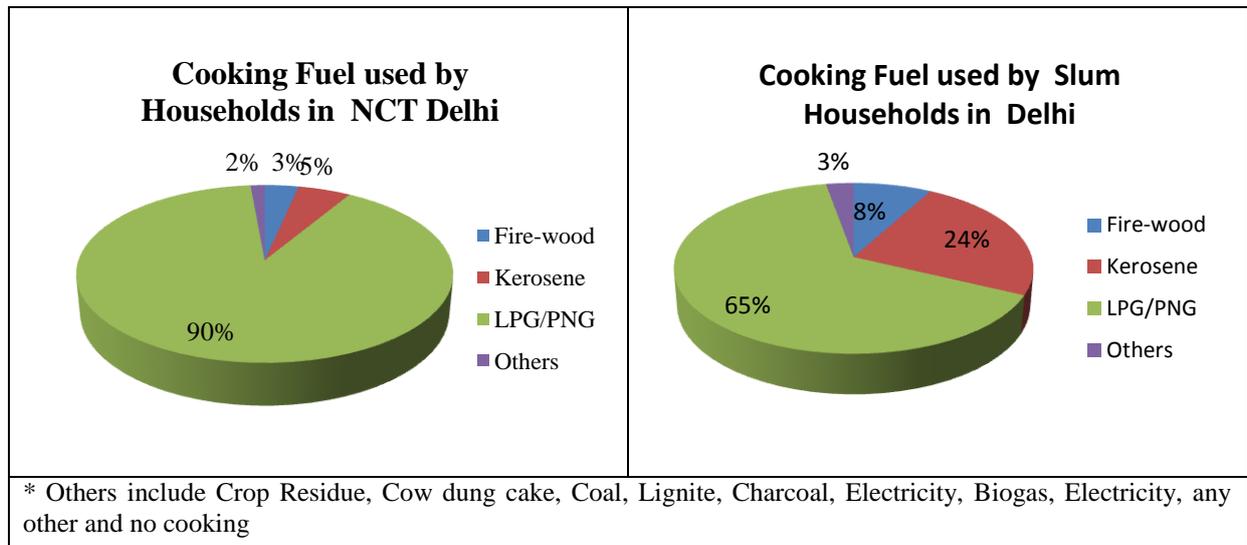


Figure 6: Cooking Fuel Pattern in Delhi

Source: Census 2011

Figure 6 shows a significant difference in the cooking energy mix in the slum households and non slum households. As of 1st March 2011, 90% of total households in Delhi were using LPG whereas LPG penetration was merely 65% among the slum households in Delhi. Kerosene is an important cooking fuel among the slum households used by 24% of them against only 5% households in NCT of Delhi, 8% of slum household use fuel wood, whereas only 2% of the households in total NCT's population, uses fire wood as cooking fuel. (Census, 2011).

3. Methodology

For the purpose of evaluation of KFD scheme, a comprehensive methodology is adopted which involves all important stakeholders during and after the implementation of the scheme. The first milestone undertaken for the study is the meeting with the state officials at Department of Food and Supplies, GNCTD (Government of National Capital Territory of Delhi). The interview helped in understanding the process of implementation of the scheme and of ascertaining its effectiveness. The initial discussions further helped in identifying various stakeholders in the scheme and structuring of questionnaires and interviews for them. Figure 7 represents the various steps undertaken for the evaluation study.

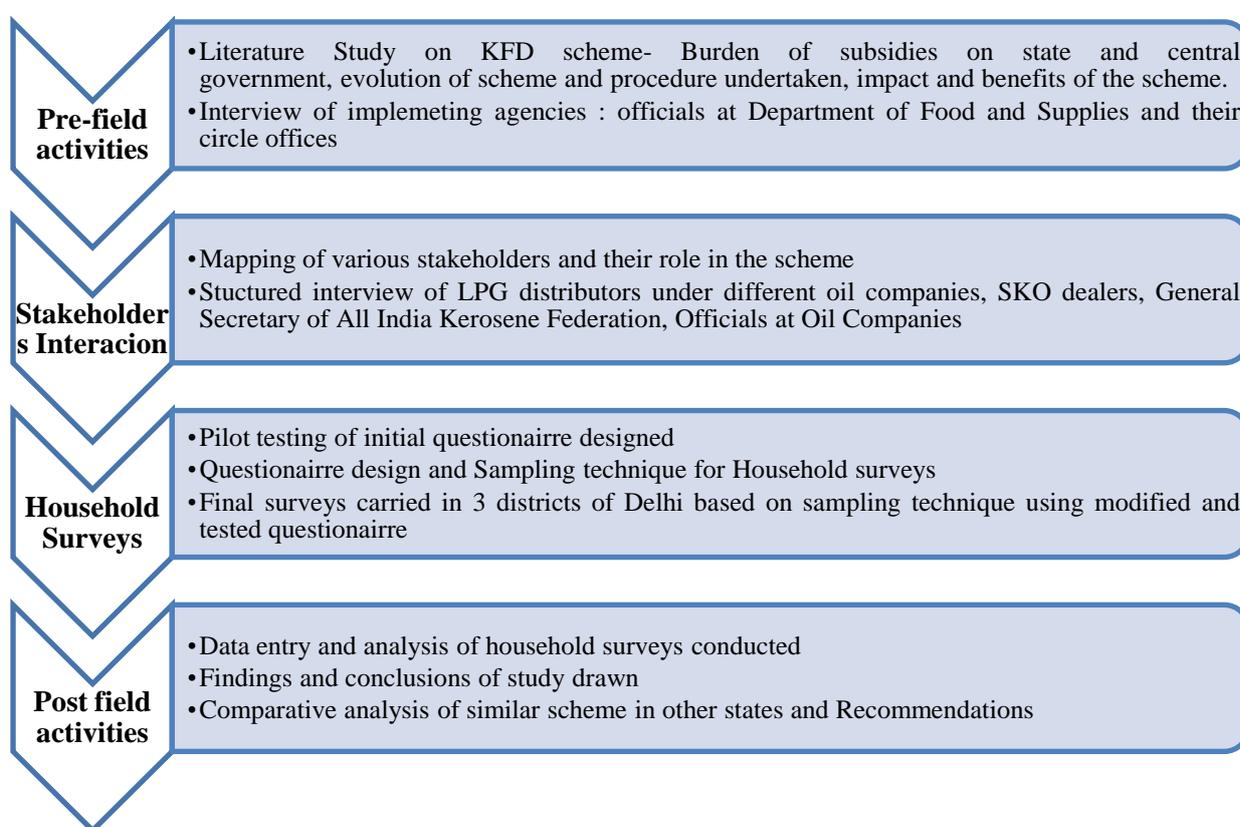


Figure 7: Methodology of Study

3.1. Pre-field activities

Literature study and interview of public officials at Department of Food and Supplies and Food and Supply circle offices are the initial steps undertaken to understand the procedure adopted under the scheme. This forms the basis for formulation of study framework and identifies different stakeholders involved in its various stages.



LPG Cylinders delivery at a common point outside the slum due to narrow & congested lanes

3.2. Household Surveys

a. Questionnaire Design

The survey questionnaire has been designed with five sections in order to assess the responses from the households. The questions in these sections are framed to understand their pattern of kerosene consumption and issues faced before the launch of the scheme, level of awareness generated and procedure undertaken by the beneficiary during implementation of the scheme, current state of LPG consumption, other secondary fuel sources still used by them, pattern of expenditure of household on cooking fuel and satisfaction with the overall scheme. A mix of open and closed ended questions is asked to the direct beneficiaries of the scheme.

b. Sampling Technique

There were around 174,990 households found in NCT using kerosene as primary cooking fuel. In North West district, around 56,943 households were using kerosene followed by 25,661 in the West, 22,518 in North East and 21,556 in South district (Census, 2011). North West ranks first in terms of total kerosene users in the state in 2011 followed by West, North East and South districts. The other predominant cooking fuels used by households in Delhi vary from LPG/PNG to crop residues, firewood, biogas and others. Figure 8 shows district wise distribution of cooking fuel sources in Delhi.

Cooking fuel Usage Break-up (Census 2011)

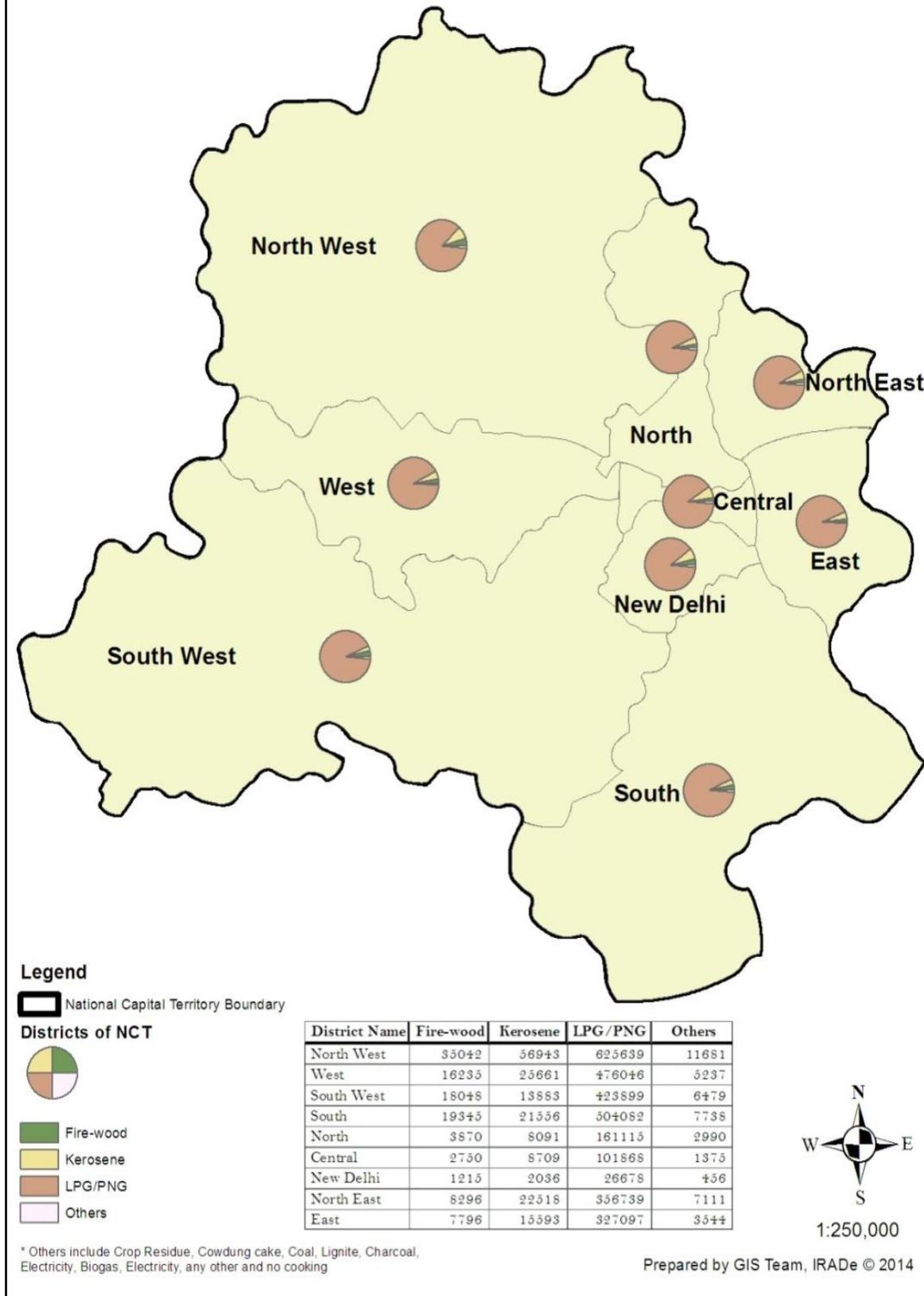


Figure 8 Cooking Fuel used in the Districts of Delhi



Households' Surveys of the beneficiaries under the scheme in North West District of Delhi- H block, Jahangirpuri

Purposive random sampling design technique was used for sample selection to conduct household level primary surveys. Total 120 sample households (beneficiaries of the scheme) were interviewed to evaluate the scheme in NCT of Delhi. These selected districts are viz.

North West (constituting Narela, Saraswati, Model Town), North East (constituting Seelampur, Shahdara, Seemapuri) and South (constituting Hauz Khas, Defence Colony, Kalkaji) which have also recorded relatively high penetration of kerosene users in Delhi (Figure 9). 40 randomly selected sample households from each of these districts were interviewed. These districts showcase a different character in terms of its sample composition owing to the interstate border locations, geographical features and socioeconomic characteristics of the population (Economic Survey, 2012-13).

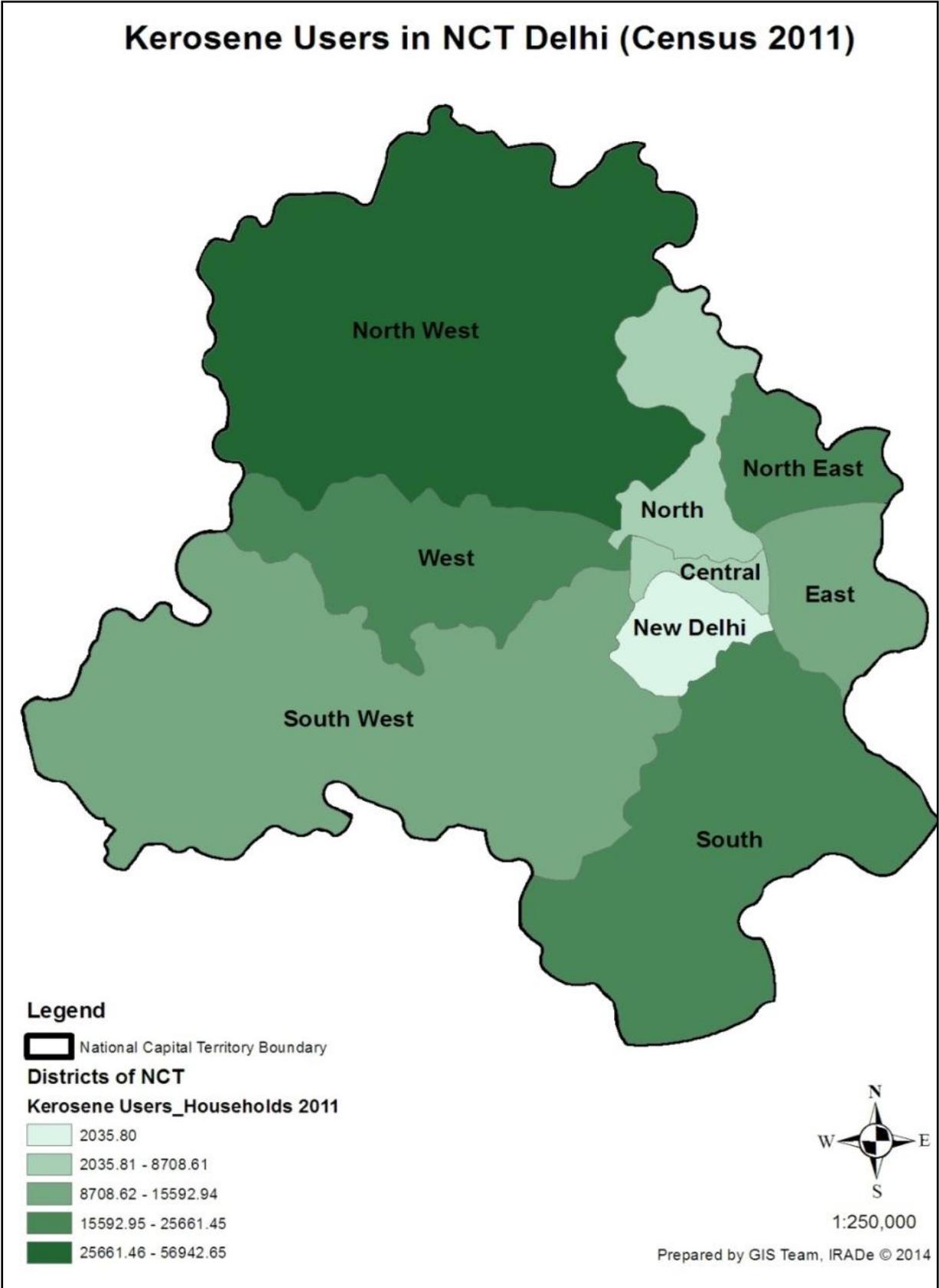


Figure 9 Penetration of Kerosene in Districts of Delhi

4. Findings

4.1. Stakeholders' Interaction

The various stakeholders engaged in the scheme are mapped in Figure 10. This facilitates the evaluation of the pre-implementation, during implementation and post-implementation stages of the KFD scheme.

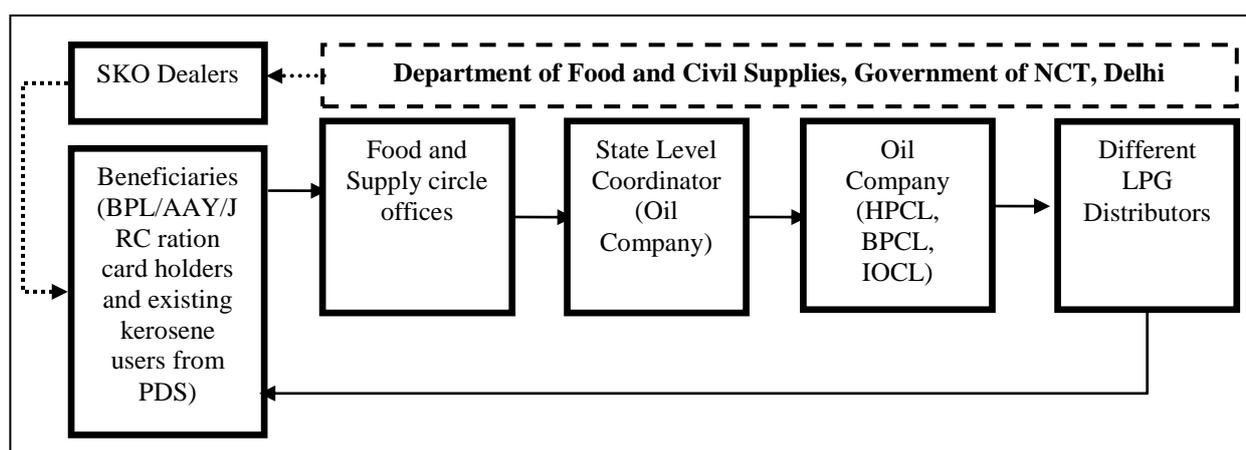


Figure 10: Stakeholders' Mapping

4.1.1 Department of Food and Supplies, GNCT Delhi

The department played an important role in the enforcement and monitoring of the scheme through weekly meetings with the concerned players and through its field agents for verification. An interview of the Special Commissioner of the Department was undertaken which further helped to structure an appropriate study framework. He informed us about the procedure undertaken for scheme implementation by various stakeholders. FSOs respective circle offices, state level coordinator, oil companies and LPG distributors have been instrumental in the implementation of the scheme. Out of 356 thousand eligible households only 214,149 households' submitted applications for LPG connection under the scheme, out of which about 20,732 were rejected. According to FSO officials, the basis of rejection of these applications was already existing LPG gas connection on their ration cards. The verification of beneficiaries took place by the department and the respective oil companies. During the consultation workshop assistant commissioner (Fuel Department, GNCTD) informed that government of Delhi gets to know that there were only 200 thousand actual kerosene users in Delhi and the other 156 thousand households registered in ePDS database were not the actual kerosene consumers. He further said that because of the due diligence conducted at the time of implementation of KFD scheme, government of Delhi got to know

about the pseudo kerosene consumers in the system. He further said that a good coordination between the oil companies and government officials and extensive use of information technology has helped the government to eliminate pseudo kerosene consumers to reduce the unwanted flow of subsidy.

In response to the question about the inclusiveness of the KFD scheme State level coordinator for the oil companies informed that the government is planning to provide free LPG connection and kit to 10,000 poor households who are using kerosene for cooking from the black market soon to make the recently concluded scheme inclusive. He also informed that the mandatory criteria of having ration card to avail free LPG connection and kit for the poor households are also relaxed.

4.1.2. Food and Supply Offices

There are 70 circle offices of FSOs under GNCTD situated at each Assembly Constituency and headed by an officer of the rank of Food & Supply Officer. These Circles have been divided into nine zones. The discussion revealed the online processing of application of beneficiaries by the food and supply officer with proper verification of beneficiaries' details as per the circular. The process is reported to be smooth with no hassles faced during filling in these forms. There was no issue raised regarding lack of manpower and technical staff or infrastructure.

4.1.3 SKO Dealers

Before the launch of the scheme, SKO dealers in Delhi were responsible for storage and distribution of subsidized kerosene to kerosene users through Fair Price Shops (FPS) and Kerosene Oil Depots (KODs). The livelihoods of SKO dealers is worst affected because of their agreement with the oil companies regarding an exclusive distribution of single petroleum product. There is a proposal in the scheme to give LPG distributorship to these SKO dealers as a compensatory measure to revive their income source.

A discussion with the President, Delhi Kerosene Storage Association and General Secretary for All India Kerosene Federation was undertaken to understand the impact on SKO dealers. He informed that a petition is filed in the High Court of Delhi by the unemployed SKO dealers against oil companies to give preference to them for allotment of an LPG distributorship in the state as their livelihood is severely affected under the scheme. In total, 90 SKO dealers have been affected with complete loss of employment. Out of this, 12 dealers

have private DDA Land and satisfy DDA norms and 6 dealers have No Objection Certificates (NOCs) for the land for setting up LPG dealership.

4.1.4 LPG Distributors

Under KFD scheme, LPG distributors under three oil companies viz. HPCL, BPCL and IOCL in Delhi are required to supply free LPG connection and the accompanying kit to the beneficiaries, after careful verification of their applications for eligibility. A HPCL distributor in East of Kailash has received 800 household forms since February 2013 out of which around 40-50 forms were rejected after verification. He purchased LPG kit from authorized dealers listed on Department of Food and Supplies website. Monthly reporting was carried out to respective circle offices of FSOs. Due payment was received within 40-45 days from oil companies. An increase of 20-25% profit is made after addition of new consumers via the scheme.

Another distributor from BPCL in Govindpuri, Kalkaji shared his experience of the overall scheme. He received a list of around 2,500 beneficiaries from KFD scheme website under Department of Food and Supplies, GNCT of Delhi. After duly verification of these beneficiaries, around 2,000 connections were released from September 2013 to May 2014 with approximately 400-500 rejections.

It was reported that normally a service radius of approximately 2.5 km is served by a LPG distributor. Due to the narrow and congested lanes in the slums, the gas cylinders are most often delivered at a common point near the slum from where the beneficiaries can collect it conveniently. Some issues like long queues and hassles during distributions are also faced.

It was reported by the LPG distributor that the amount incurred for each connection was approximately Rs. 1,640 and an extra Rs. 2,000 per connection spent on additional manpower and stationary during the scheme. A BPCL distributor also reported that he faced the problem of non-payment of the due amount by Oil Company which currently accounts for approximately Rs. 300,000.

It can be inferred from the interaction with the LPG distributors that they perceived the scheme as a good scheme which has generated additional business for them, keeping aside the minor issues like non payment of dues by the oil companies.

4.2. Profile of Surveyed Households

Out of the total respondents, 54% were females and 46% were males. Around 46% respondents' family size range from 5 to 7, 33% with more than 7 members and 23% range from 0 to 4 family members in the house (figure 11). However, average household size of NCT of Delhi is 4.9 with 5.5 as maximum which is found in the North East district followed by 5.0 in North West, North and Central districts of Delhi (Census, 2011).

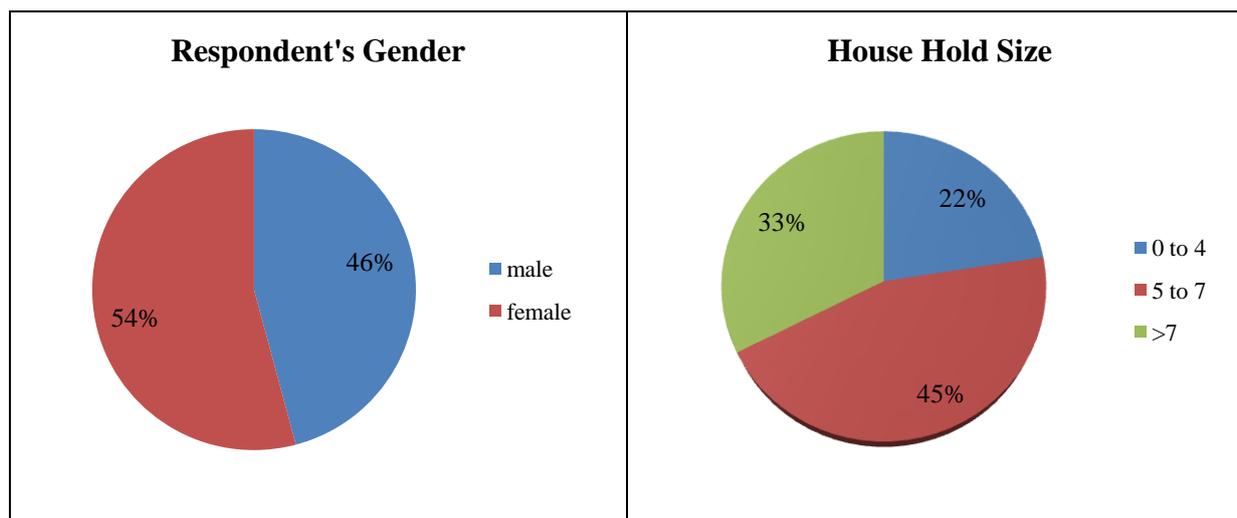


Figure 11: Profile of Sample household

Source: IRADe Surveys

Around 60% respondents owned BPL ration cards followed by 33% AAY ration card holders and 7% JRC ration card holders. The economic condition of the family is revealed through the household monthly income. Around 48% surveyed households report it between Rs 5,001- Rs 10,000, 36% report it less than Rs. 5,000, 13% reported between Rs 10,001 and Rs 15,000 and 3% reported more than Rs. 15,000 (figure 12).

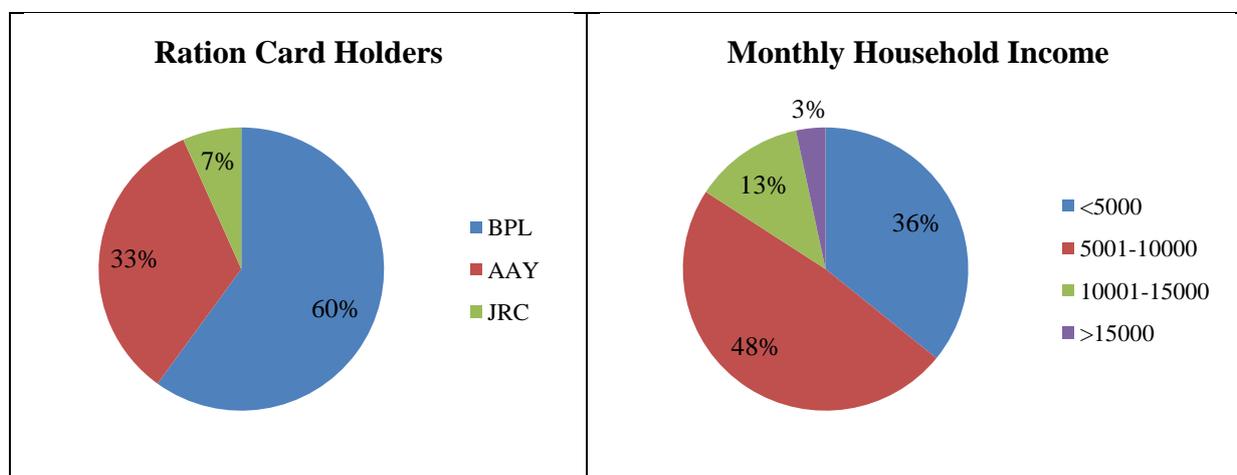


Figure 12 Economic Profile of Samples Surveyed

Source: IRADe Surveys

4.3. Cooking Fuel Pattern before the Scheme

Before the scheme was launched the households relied on traditional cooking fuels like kerosene, firewood and cow dung. 40% of the households used kerosene exclusively for their cooking needs. The households received kerosene for their cooking needs mainly from two sources -Public Distribution System and Black Market as there is no open markets for kerosene exist in India. Kerosene meant to sell in the PDS shops, get diverted and sold at a higher price to consumers in the black market. The households usually resorted to purchase kerosene from the black market because the kerosene allocated to them from the PDS never sufficed their entire cooking needs. 59% of the households consumed 10-20 litres of kerosene and 29% consumed less than 10 litres for their monthly cooking needs from the PDS. This accounts for average 13.5 litres per month PDS kerosene consumption per household in Delhi. Also, 63% of the households resorted to purchase kerosene from the black market with 44% purchasing less than 10 litres of kerosene from the black market (figure 13).

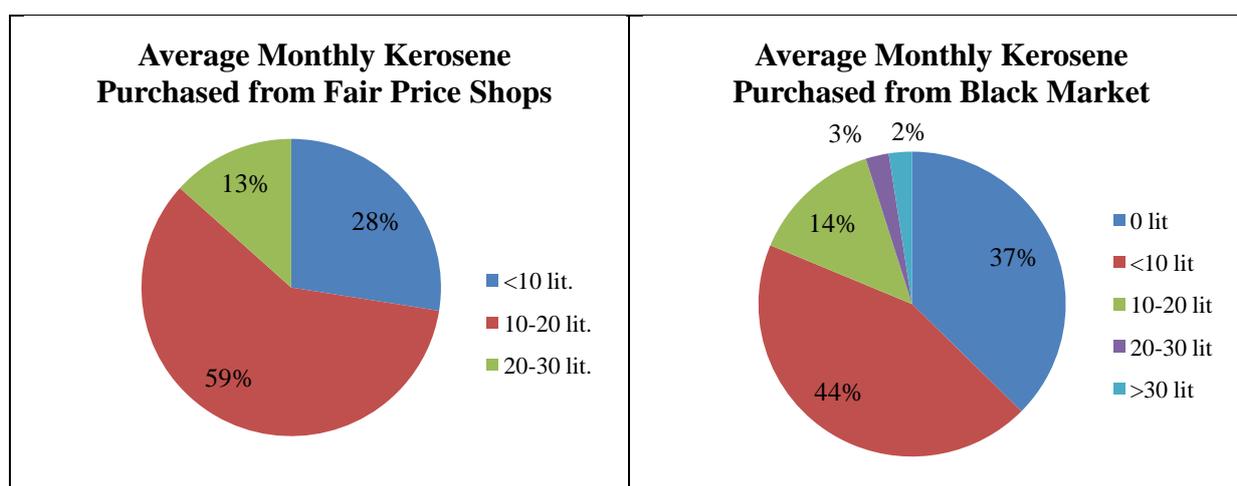


Figure 13: Average Monthly Kerosene Consumption before the Scheme

Source: IRADe Surveys

Apart from using kerosene (PDS and black market) as their primary cooking fuel, around 58% of the households needed to depend on alternative fuels like firewood, cow dung and LPG purchased from the black market as well. The most common alternative source of cooking fuel was firewood with 43% of the total households using it followed by black LPG with 9% of the households using it. There was a small 2%, which used all the three alternatives (figure 14).

“The Ration Shops from where subsidized kerosene for cooking was to be collected was very far. Because of long queues, sometimes we had to wait from 6 am to 1 pm. Besides, the rude behaviour of the shopkeeper worsened our plight. Therefore, we resorted to kerosene from black market paying higher price. With LPG cylinder, we are spared from the hassle that was involved in collecting PDS Kerosene.”

-Shah Jahan, Buland Masjid, Shastri Park (North East District)

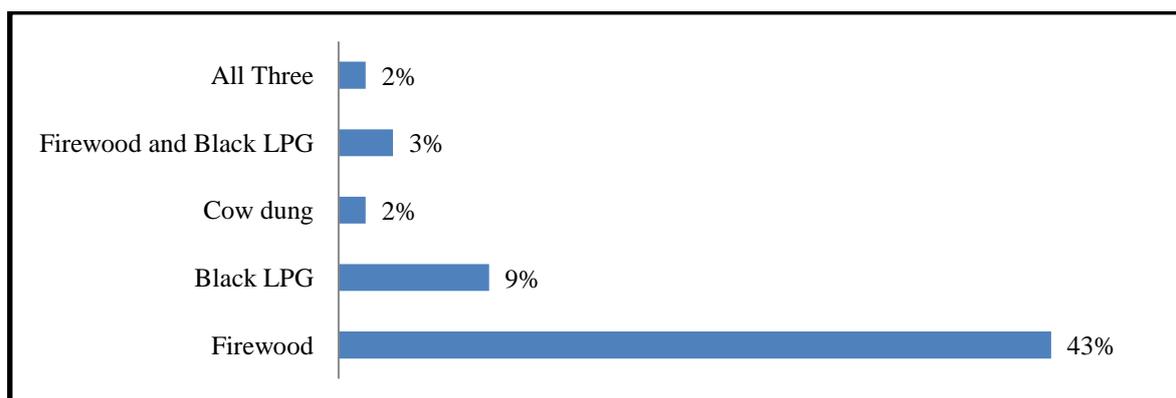


Figure 14 Alternative Fuels used apart from Kerosene before scheme

Source: IRADe Surveys

When asked about the reasons for not having taken any initiative to shift to a cleaner and more modern cooking fuel like LPG more than half of the households stated their poor financial status as the major reason. 55% of the households never attempted to obtain a legal LPG connection because they could not afford the upfront costs. Also, 33% respondents mentioned their unawareness about the procedure involved to obtain a legal LPG connection. The hassles involved in the procedures for obtaining subsidized LPG connection were also cited as reason by 15 percent of the respondents for not applying for LPG connection (figure 15).

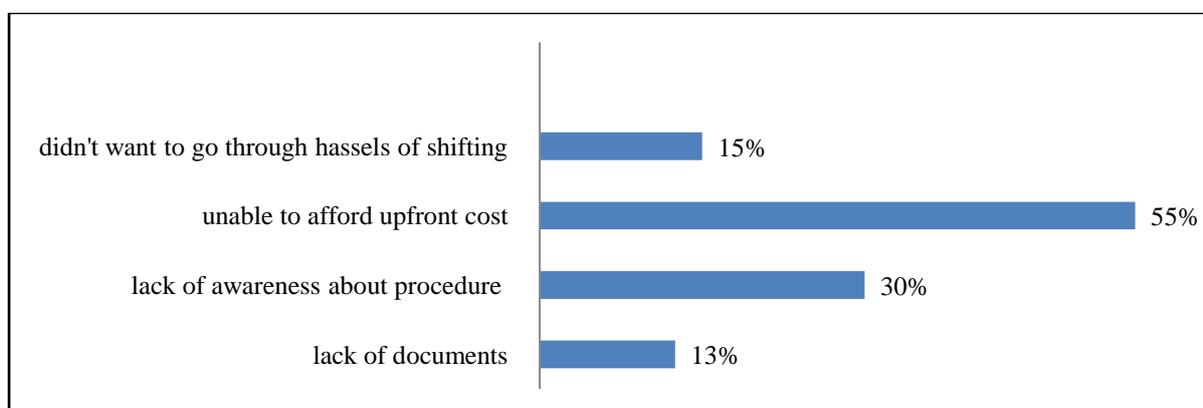


Figure 15 Reasons for not shifting to LPG before scheme

Source: IRADe Surveys

4.4. Implementation of the Scheme

One of the most essential parts to smoothen the scheme implementation process is the publicity of the scheme which not only includes the required procedural follow up, but also the awareness about the benefits of the scheme for intended beneficiaries. Around 72% respondents were satisfied with the level of awareness generated among them. The rest had negative responses with few personal opinions. The prime source of information about the scheme before its launch is found to be from their immediate neighbours. Figure 16 shows that around 46% received information about the scheme from their neighbours, 42% from fair price shops (FPS), and 26% from printed and electronic media sources like newspapers, pamphlets, Television and rest from government officials which is merely 8%.

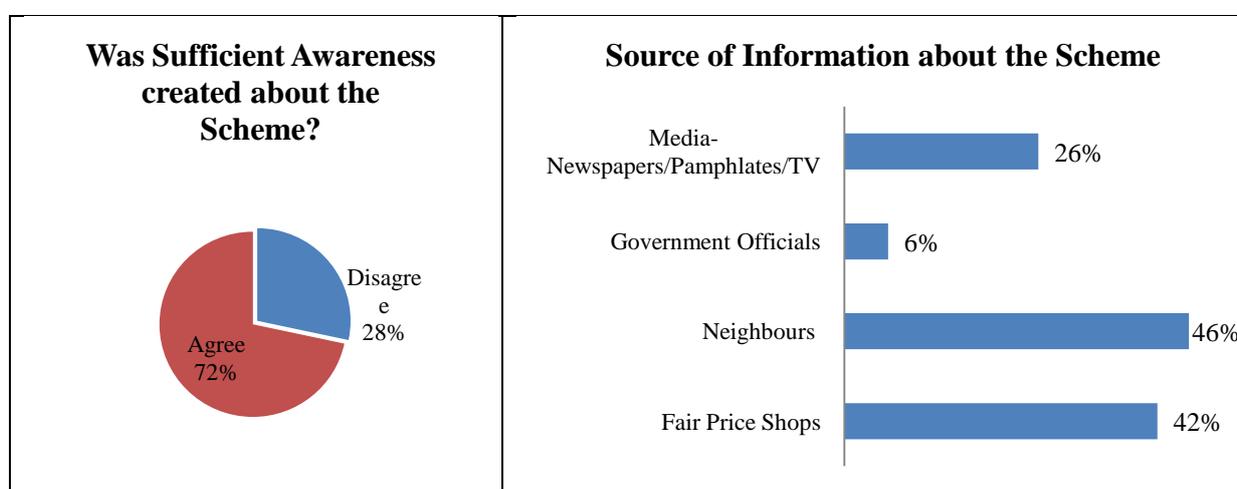


Figure 16 Awareness about the Scheme

Source: IRADe Surveys

There were around 65% respondents who reported the application procedure simple without any major hassles faced. However, 24% found it simple with the help of middlemen who largely helped in writing their applications with some nominal amount and 8% found it simple after paying some bribe. 8% of the total respondents reported the procedure to be complicated to follow (figure 17). The level of illiteracy among poor households is one of the reasons for this problem faced during filling in the applications.

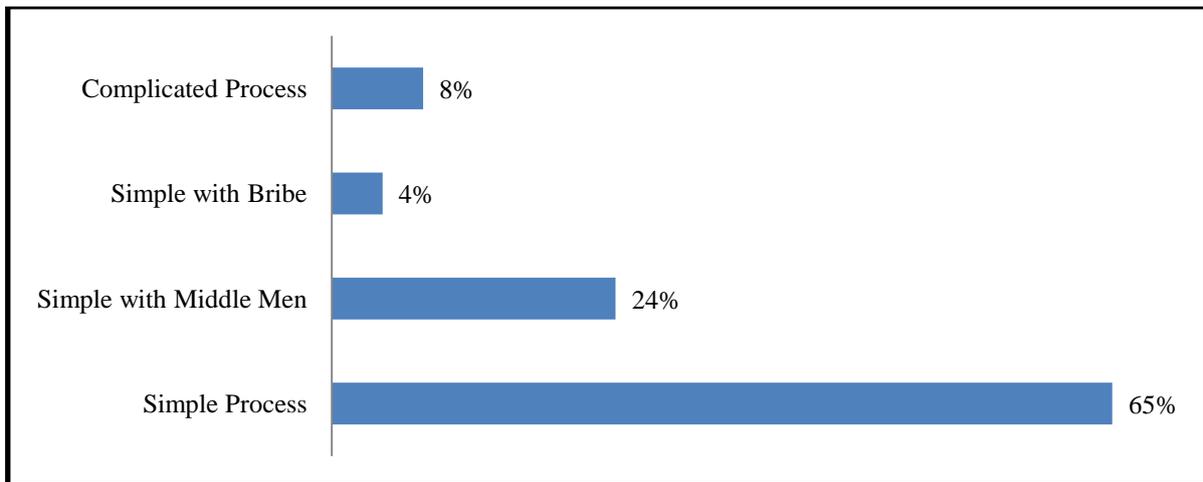


Figure 17 Ease of Application Process

Source: IRADe Surveys

Very few issues were faced by the beneficiaries during the procedure. Almost 63% respondents faced no hassles with 14% having a lack of required documents, 12% finding it a complicated process, 8% reporting long queues and 4% were unaware about the application procedure (figure 18).

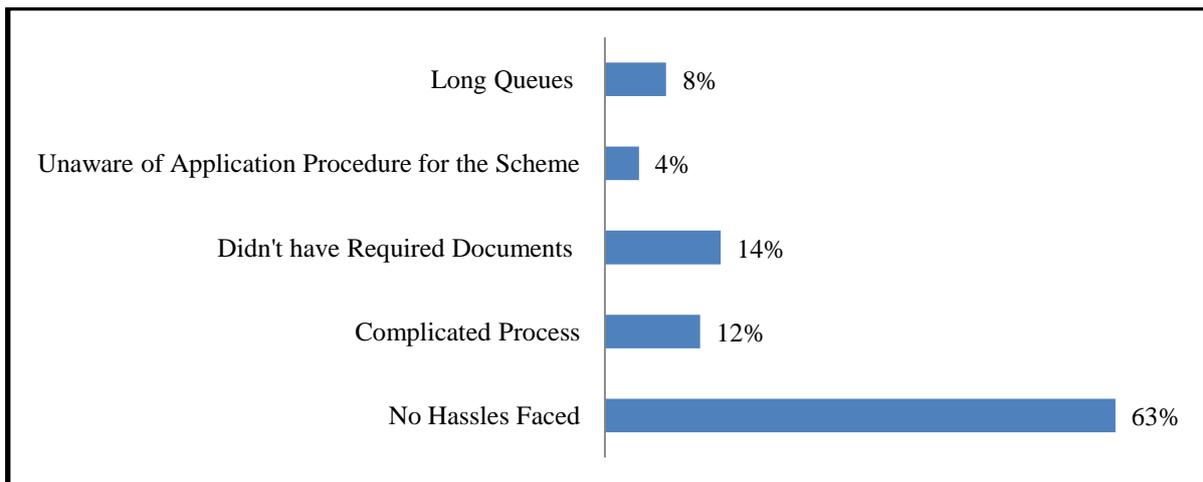


Figure 18 Hassles faced during Application Process

Source: IRADe Surveys

Also, some respondents were asked if they paid some additional connection charges to the officials instead of fully free LPG connections. The percentages of such respondents are very less which is around 7% only with 93% respondents reporting no additional connection charges (figure 19). This confirms primarily a bribe free scheme implementation. Also, another issue which was realized during our surveys is denial of kerosene for cooking

"I sometimes found the amount of gas in the cylinder less by 1-2 kg. To confirm my doubts, I bought a weighing machine. Thereafter, the situation has improved"

- Manju from Jahangirpuri (North West District)

purpose at PDS shops before the LPG cylinder could reach these households. This period of denial varies from 1 to 6 months. This encouraged poor households to either arrange kerosene from the black market or traditional fuel sources like firewood, cow dung cakes, crop residues etc.

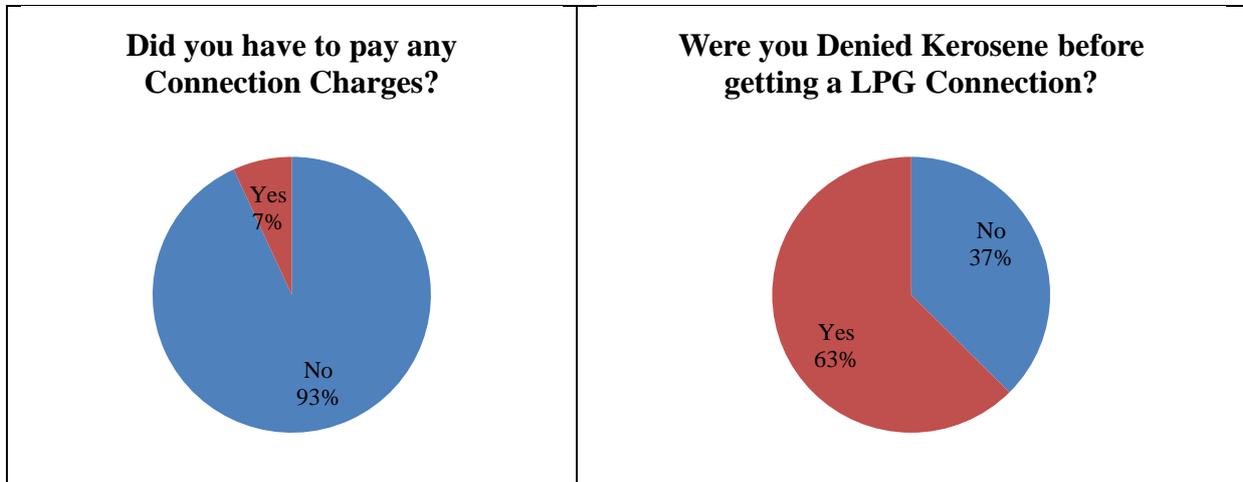


Figure 19 during Scheme Implementation

Source: IRADe Surveys

After the procedure of applying under the scheme was completed and LPG cylinders reached the intended households, there were still some issues faced by the households. Around 36% households lack the knowhow of using LPG gas stoves and 4% faced a difficulty in obtaining the cylinder. The cylinders either were not available or difficult to bring from LPG distributors' shops in terms of travel and time costs. However, 60% households reported no problems faced with this shift from kerosene to LPG as their primary cooking fuel (figure 20). This shows a scope of filling in this gap with orientation and training camps for poor households to create more awareness on the benefits and usage of cleaner cooking fuel.

“The entire process took 4 to 5 months and we were denied PDS kerosene during that time. I managed by using cow dung cakes and firewood which I collected from nearby forest”

- Hasina from Buland Masjid, Shastri Park (North East District)

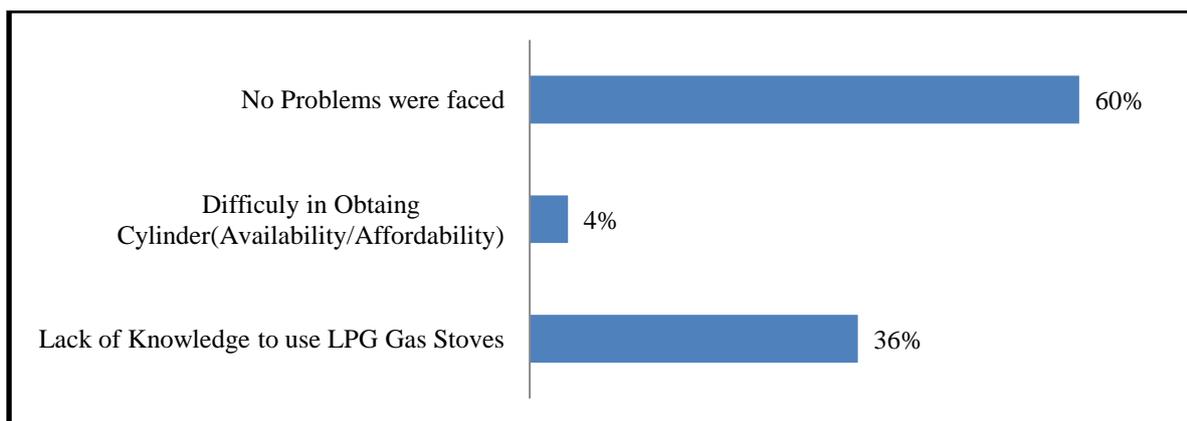


Figure 20 Issue faced when shifted from Kerosene to LPG

Source: IRADe Surveys

4.5. Impact of the Scheme

In order to evaluate the impact of the scheme it was important to understand the cooking fuel patterns of the households after the scheme was implemented. Around 58% of the households mentioned that all their cooking requirements were being met exclusively by LPG. The remaining 42% of the households however supplemented their cooking fuel by using alternative fuels like firewood, purchasing kerosene from the black market and also purchasing small LPG cylinders available in 2 to 5 kg bottles in the black market. It was seen that firewood still remained the most prominent alternative fuel with 28% of the households using it followed by a 13% of households who use small LPG cylinders purchased from the black market. Even though the scheme intended to wipe out kerosene as a cooking fuel from Delhi it was seen that a 9% of the households still used kerosene for cooking which was available to them through the black market (figure 21). This brings out the fact that a market for kerosene still exists in Delhi and is met through illegal kerosene which is smuggled from neighbouring states.

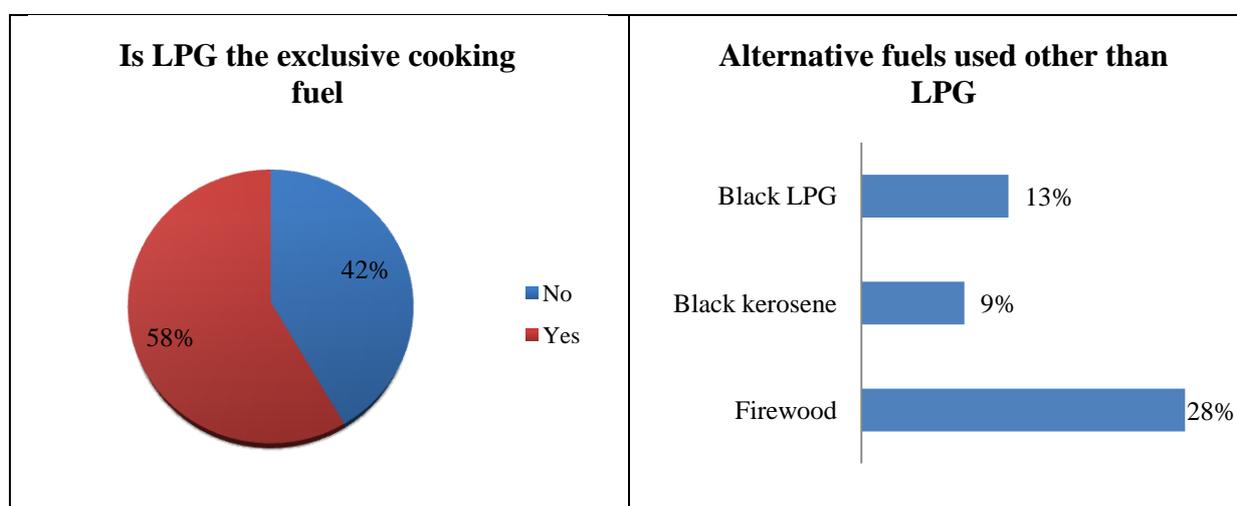


Figure 21 Cooking Fuels used after the Scheme

Source: IRADe Surveys

With LPG cylinders being the primary cooking fuel, for 72% of the households, one LPG cylinder lasted for 1 month or less and for 24% of the households it lasted for 1-1.5 months. The cylinders were easily available to 75% of the households with the remaining 22% facing difficulties like delay in delivery of cylinders, the cylinders not being delivered at their doorsteps and them having to incur extra costs to collect the cylinders. A 3% also mentioned about having to pay a nominal bribe to the LPG cylinder delivery person (figure 22).



Small LPG cylinders available in black market in North East district of Delhi: Buland Masjid, Shastri Park

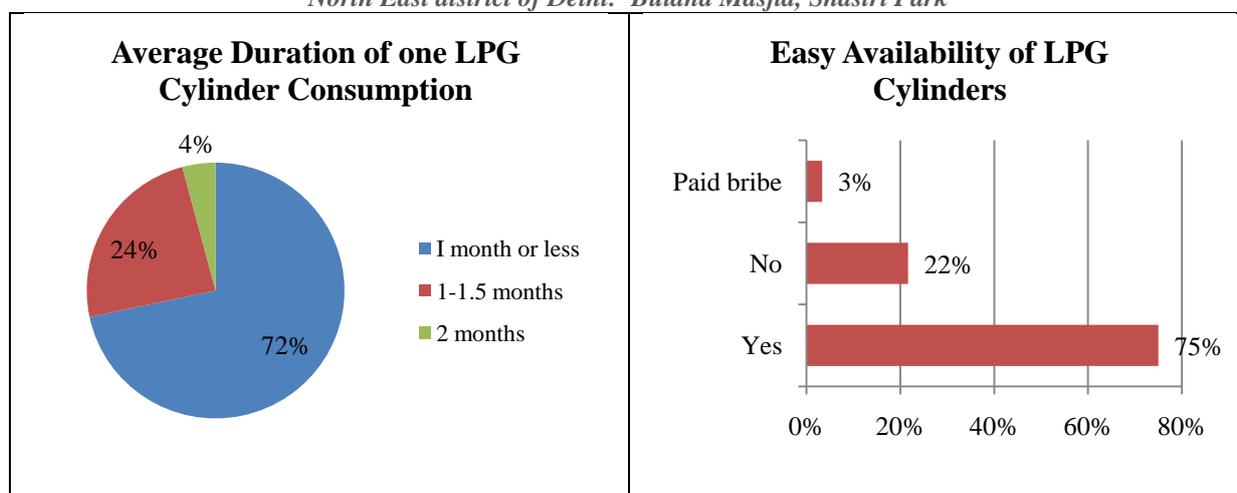


Figure 22 Present Consumption Pattern of LPG as Cooking Fuel

Source: IRADe Surveys

An analysis of household expenditure on cooking fuel revealed that for 26% of households the total expenses on cooking fuel has decreased after the launch of the scheme. From the primary survey, it was found that in NCT of Delhi, the average PDS kerosene consumption per household is 13.5 litres per month. Before the launch of the scheme these households also need to buy kerosene from the black market at a price much higher than the prevailing PDS price, to meet the deficit of the kerosene allocated through the PDS shops. Small LPG cylinders were also purchased from the black market at high prices. With the launch of this

scheme these households obtained LPG cylinders at subsidised prices, which met their daily cooking requirements thus reducing their expenses on cooking fuel.



LPG as new cooking fuel: The LPG kit distributed under KFD scheme

Note: As per the guidelines hot plate (Gas Burner) should not be kept on the ground. But slum dwellers lacking proper kitchen and space in their houses compel them to keep the hot plate on the ground.

People are satisfied with the benefits they avail from using LPG as cooking fuel even though their total cost of cooking fuel has increased marginally. Around 97% households stated that they are satisfied with using LPG to meet their cooking fuel requirements. The major non monetary benefits associated with the use of LPG are time saved in cooking;

“I have to travel 6 to 7 km to Chirag, Delhi to collect my monthly quota of cylinder from agency. I had to bear approximately Rs 100 to 200 as travel cost besides my time and energy. The delivery at home recently started after lot of complaints.”

- Satyendra from Sarvodaya Camp (South Delhi)

time saved in washing utensils, convenience in using LPG stoves etc. However, they were not aware of the health benefits they were getting.

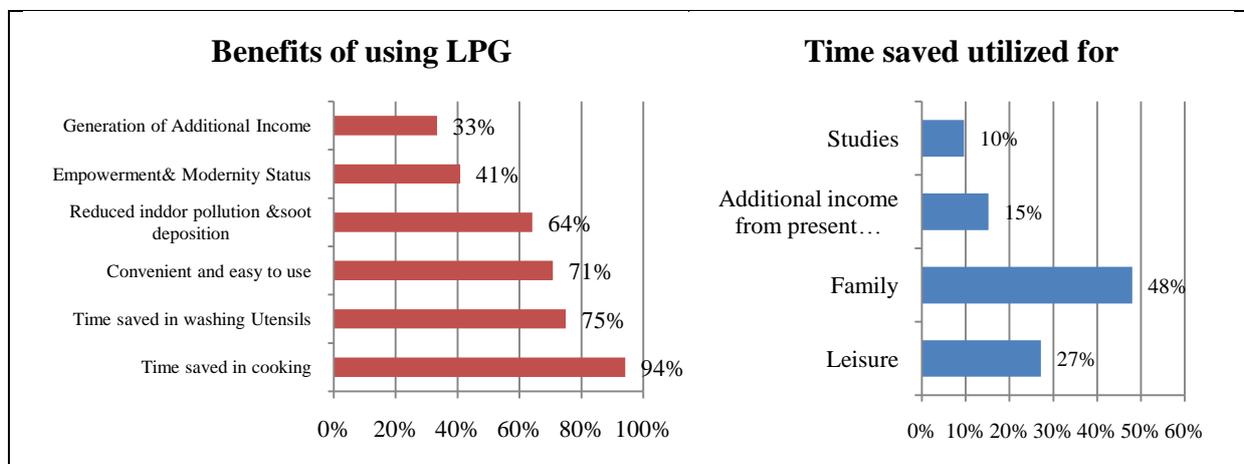


Figure 23 Benefits of Using LPG for Cooking

Source: IRADe Surveys

Time saved in cooking was recognized as the maximum reported non-monetary benefit under the scheme, by 94% of the households, followed by the ease in cleaning utensils and the convenience of using LPG cylinders and stove over kerosene. On an average, 2 hours per week is found to be saved by women households with the introduction of LPG as the cooking fuel. This 2 hour time saved also includes the time saved in collection of PDS kerosene from fair price shops. The time saved is being utilized for attending to family needs and leisure (figure 23 and 24). Around 79% of earning members of the household have reported ability to earn additional income by devoting more time to their current occupation. The school going children found to dedicate more time to their studies rather than standing in long PDS supply queues as generally they had to go to the PDS shops to get kerosene.

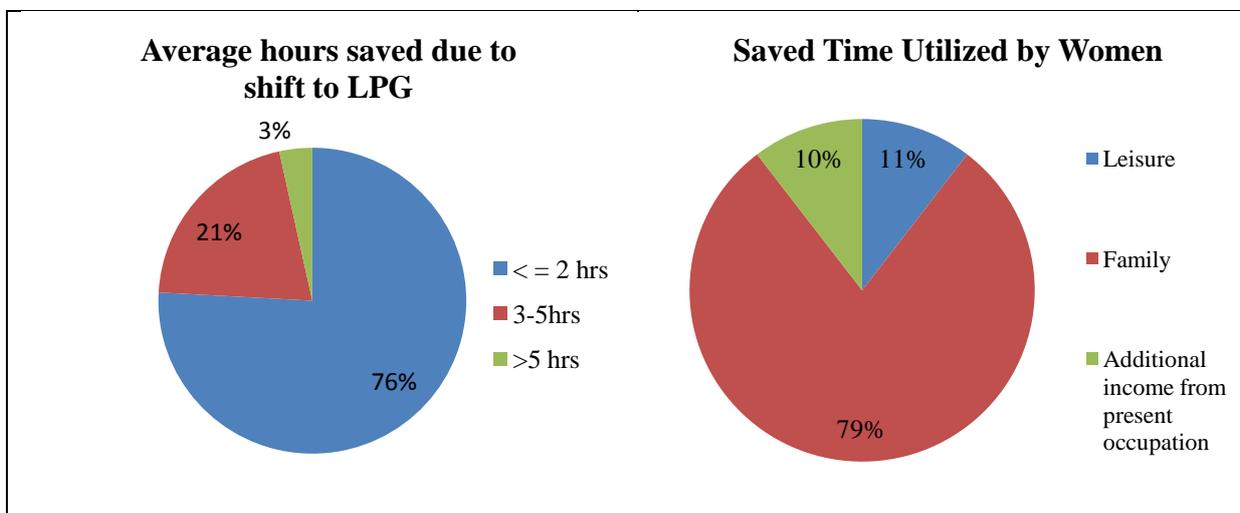


Figure 24 Time saved due to shift to LPG from kerosene

Source: IRADe Surveys

The average monthly expenditure on various cooking fuels used by slum households in Delhi was found to be approximately Rs 370 before the scheme. It includes kerosene from PDS and black market, traditional fuel sources such as firewood and crop residues and LPG from black market. However, the same average monthly household expenditure on cooking fuel increased by merely Rs. 57 after the implementation of the scheme with use of LPG (figure 25). This marginal increase in expenditure can also be attributed to the unaccounted cost of firewood and crop residue. Crop residue and fuel woods are generally available to the household free of cost.

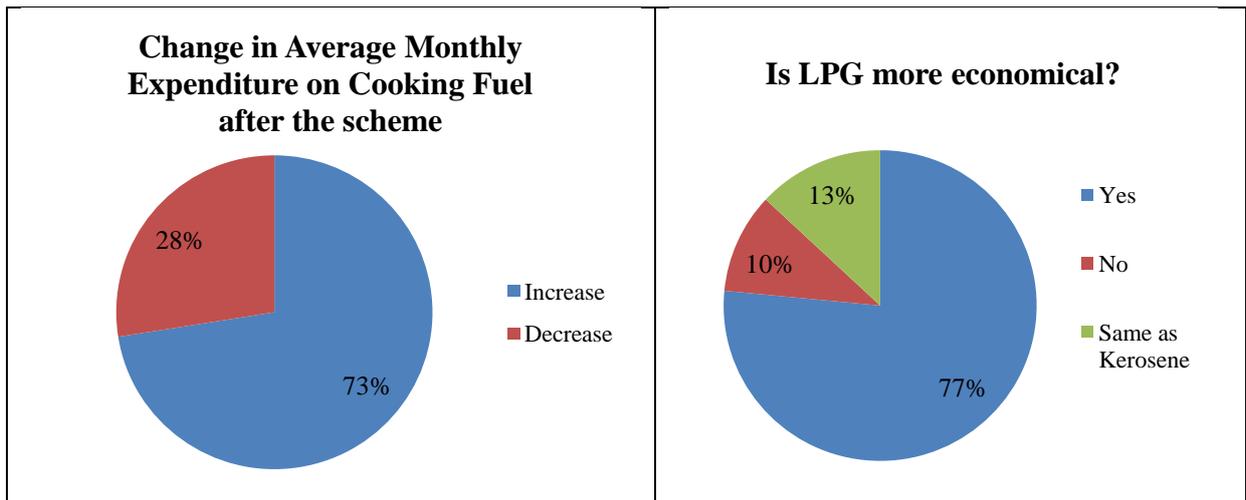


Figure 25 Monthly Expenditure Pattern before and after the scheme

Source: IRADe Surveys

As per IRADe surveys, this increase comprises of 72% of total respondents. The benefits in terms of better indoor air quality and improved health of households are availed only at a marginal increase in their monthly expenses. However, 77% households reported LPG to be more economical than kerosene, with 10% not finding it as economical as kerosene and 13% same as cost of kerosene.

5. Extension of Kerosene Free Scheme to Other Indian Cities

In order to assess the scope of replication of the KFD scheme to other Indian cities, a feasibility study was undertaken for some of the most populated cities in the country. For the implementation of this scheme in Delhi, the BPL/AAY/JRC ration card holders who were consuming PDS subsidized kerosene for their cooking needs were targeted under the scheme. On the basis of this evaluation study, the criteria chosen to identify cities with high potential to implement similar schemes is the high concentration of kerosene users and low penetration rate of LPG for cooking fuel among the poor households. The 25 Indian cities which have been chosen for the study are listed in Table 3. In Delhi, a considerably higher penetration rate of kerosene as cooking fuel among poor households is observed. Kerosene is an important cooking fuel among the slum households used by 24% of them against only 5% households in NCT of Delhi. The Indian cities with a relatively higher percentage of slums are found to be Visakhapatnam (45%), Mumbai (42%), Nagpur (36%), Agra (34%), Kolkata (31%), Indore (30%), Chennai (29%), Bhopal (27%), Pune (22%), Ghaziabad (20%) and Thane (18%).

Table 3 List of Major Indian Cities

S.No	City	Total Population	Total Slum Population	% of Slum Population to Total Population
1	Mumbai	12,478,447	5,206,473	42%
2	Delhi	11,007,835	1,785,390	16%
3	Bangalore	8,425,970	712,801	8%
4	Hyderabad	6,809,970	406,000	6%
5	Ahmadabad	5,570,585	250,681	5%
6	Chennai	4,681,087	1,342,337	29%
7	Kolkata	4,486,679	1,409,721	31%
8	Surat	4,462,002	467,434	10%
9	Pune	3,115,431	690,545	22%
10	Jaipur	3,073,350	323,400	11%
11	Lucknow	2,815,601	364,941	13%
12	Kanpur	2,767,031	425,008	15%
13	Nagpur	2,405,421	859,487	36%
14	Indore	1,960,631	590,257	30%
15	Thane	1,818,872	326,798	18%
16	Bhopal	1,795,648	479,699	27%
17	Visakhapatnam	1,730,320	770,971	45%
18	Pimpri and Chinchwad	1,729,359	129,099	7%
19	Patna	1,683,200	77,034	5%
20	Vadodara	1,666,703	84,804	5%
21	Ghaziabad	1,636,068	333,962	20%
22	Ludhiana	1,613,878	244,163	15%
23	Agra	1,574,542	533,554	34%
24	Nashik	1,486,973	189,721	13%
25	Faridabad	1,404,653	215,053	15%

Source: (Census, 2011)

5.1. Major Indian Cities

The top 12 Indian cities with a high percentage of slum population are further analysed to understand the rate of penetration of LPG and kerosene among the urban households for cooking. It is interesting to note that 24% urban households in Kolkata use kerosene to meet their daily cooking needs followed by Mumbai (18%), Thane (17%), Bhopal (15%) and Chennai (14%). Ghaziabad and Agra showed a lower penetration of Kerosene among urban households for cooking fuel. 5% urban households in Delhi were using kerosene before the launch of KFD scheme. This constituted the targeted beneficiaries of the scheme. As far as LPG is concerned, Visakhapatnam shows the least penetration rate of LPG as cooking fuel among its urban households. LPG users account for only 40% of its total urban population. Other cities which have less than 80% urban households using LPG for their cooking needs are Kolkata, Agra, Thane, Mumbai and Nagpur. In cities such as Agra, only 1% urban households are identified among kerosene users and 72% urban households are identified as LPG users. This indicates an extensive use of traditional cooking fuels such as cow dung cakes and crop residue by the urban households. This highlights the need to make an inclusive scheme where other traditional polluting cooking fuels are also considered to achieve maximum social and environmental benefits to marginal social groups. Table 4 and 5 show the list of selected 12 cities with the composition of kerosene and LPG users among their total urban households respectively.

Table 4 Kerosene Users in Major Indian Cities

Ranking Kerosene Users	City	Total Urban Households	Kerosene Users - Urban HHs	% of Kerosene Users in the city
1	Kolkata**	964,183	232,818	24%
2	Mumbai**	2,027,743	357,625	18%
3	Thane**	1,904,219	323,360	17%
4	Bhopal	396,666	58,534	15%
5	Chennai	1,106,567	154,969	14%
6	Pune	1,332,493	147,882	11%
7	Nagpur	671,240	35,482	5%
8	Delhi	3,261,423	169,320	5%
9	Visakhapatnam	542,692	26,931	5%
10	Indore	462,075	22,423	5%
11	Agra	305,508	3,447	1%
12	Ghaziabad	587,116	5,707	1%

Source: (Census, 2011)

** Immense Potential for KFD replication

Table 5 LPG Users in Major Indian Cities

Ranking LPG Users	City	Total Urban Households	LPG Users - Urban HHs	% of LPG Users in the city
1	Visakhapatnam	542,692	219,238	40%
2	Kolkata**	964,183	623,579	65%
3	Agra	305,508	219,238	72%
4	Thane**	1,904,219	1,461,492	77%
5	Mumbai**	2,027,743	1,586,946	78%
6	Nagpur	671,240	521,406	78%
7	Chennai	1,106,567	910,262	82%
8	Pune	1,332,493	1,100,217	83%
9	Indore	462,075	381,603	83%
10	Ghaziabad	587,116	494,883	84%
11	Delhi	3,261,423	2,944,486	90%
12	Bhopal	396,666	381,603	96%

Source: (Census, 2011)

** Immense Potential for KFD replication

In order to understand the financial motivation for the scheme implementation, Mumbai is considered which has nearly half of the urban population living in slums. Mumbai has a total population of 12.48 million with almost 42% urban population living in slums and 18% total kerosene users in urban areas. The procedural modalities of functioning of PDS in Mumbai are different from the rest of the districts in Maharashtra. The PDS is functioning in the Mumbai-Thane Rationing Area (MTRA) which includes Mumbai city, Mumbai Suburban areas and some urban parts of Thane and Raigad Districts. As per the state government reports, total PDS kerosene allotted to MTRA was 12,576 kilolitres in December 2013. Considering a subsidy of Rs. 34.80 per litre for 2013, the cost incurred by the government is estimated to be Rs. 5250 million per annum on kerosene as cooking fuel. However, considering 9 cylinders, LPG quota per annum and a subsidy of Rs. 522.10 per cylinder for 2013, the cost which would have incurred on intended 809,978 kerosene users in MTRA urban areas comes around Rs. 420 million. This shows that the diversion from kerosene to LPG for meeting daily cooking needs of the poor households in cities like Mumbai, will lead to savings on cooking fuel subsidy of around Rs. 4830 million per annum. Also, assuming Rs. 3000 expenditure to provide free LPG connection and start up kit to these urban households, an initial investment from government side would be Rs 2420 million. This initial investment of Rs. 2.42 billion shows strong potential to save approximately Rs. 4830 million per annum for metropolis region like MTRA. Besides, the scheme will have many social and environmental benefits in

terms of health and indoor air quality especially for vulnerable social groups such as women, children and poor households.

Therefore, considering a high percentage of slum population of their total population, high number of kerosene users and low penetration rate of LPG as cooking fuel among their urban households, major cities such as Kolkata, Mumbai, Thane, Bhopal, Chennai, Visakhapatnam, Nagpur etc. are strongly recommended for replication of the Kerosene free scheme in India. In urban India, the use of kerosene from PDS was most widespread in West Bengal (61.5% households), Kerala (59%), Bihar (53%), and Uttar Pradesh (49%).

5.2. Rural Scenario

Rural India accounts nearly two third of the total population of India. Rural and urban population distributions in India were recorded at 68.84% and 31.16% respectively in 2011. Census 2011 data on cooking fuel showed that over 85% of rural India were using traditional cooking fuels such as firewood, crop residue and cow dung as their primary source and only 1% were relying on kerosene for cooking. However, census 2011 data also revealed that 43% of the rural households were using kerosene to light their houses which implies that the kerosene subsidy in rural India is primarily being utilized for lighting purpose.

In all the major States, except Punjab and Haryana, the proportion of households reporting consumption of kerosene from PDS purchase ranged from 72% to 94% in the rural sector and from 18% to 62% in the urban sector. In the rural sector, the contribution of PDS purchases to total kerosene consumption was more than 80%. Use of PDS kerosene was most common in West Bengal for both rural areas (91%) and urban areas (60%).

MoPNG Oil sector Vision 2015 for 'Consumer Satisfaction and Beyond' which came up in 2009, further set the target to extend the usage of LPG for cooking purposes in rural and underserved areas so that the standard of life in rural areas improves and the womenfolk in the backward and underdeveloped areas of the country can reap the benefits of cooking on LPG stoves rather than use kerosene/fire-wood. This shift from kerosene and firewood in rural India was expected to result in environmental protection and reduction in cutting down of trees in forest areas for use as firewood.

As per NSSO 68th round, in rural India monthly per capita kerosene consumption was 0.534 litres which accounts for approximately 444.82 mega litres of PDS kerosene per month.

Considering a subsidy of Rs. 34.8 per litre in 2013, the cost of subsidy incurred by government for rural India alone is estimated to be approximately Rs. 186 thousand million per annum. In such a rural scenario, if obsolete kerosene lamps are replaced by solar lanterns made using LEDs or CFLs then it will definitely help in lowering the burden of the subsidy cost of government. This will also improve the source of lighting in Indian villages. Similarly, providing free LPG connections for cooking to the rural households will further divert them towards a cleaner cooking fuel in comparison to polluting fuel source such as firewood and hence, ensuring a better quality of life in rural India as well.

Assuming rural household size to be 5.5, approximately 35.24 litres per annum per household would cost Rs. 1,226.35 per annum as subsidy on kerosene. If this amount is spent on providing two solar lanterns to each eligible household instead of kerosene, its cost would range from Rs. 500 to Rs. 1,500 and can recover its cost in only one year. Similar rural based lighting technologies and cleaner cooking fuels in rural India will not only subjugate kerosene subsidy costs to government, but also provide a cleaner and more modern source of lighting in the villages of India. It is concluded that KFD scheme shows great potential to be replicated in rural India as well and will pave a path towards “Kerosene Free Villages”.

6. Concluding Remarks

“Kerosene Free Delhi” scheme launched on 21st August 2012 by the state government, intended to shift the poor households in the state to LPG as primary cooking fuel from PDS kerosene at subsidised prices. The scheme focused to shift the subsidy from a dirty cooking fuel (kerosene) to cleaner cooking fuel (LPG) and hence, ensuring better health and environment with reduced indoor air pollution.

As per ePDS data base of the Delhi government, there were 356.39 thousand kerosene users in Delhi in the year 2012 who were the targeted population out of which 214.49 thousand applicants applied for LPG connection under this scheme. As per the information from the nodal agency, 193,417 beneficiaries received the connection under KFD Scheme (214,149 applications were received for free gas connection under the scheme, out of which 20,732 were rejected). The total rejections account for 9.68% of the total applications received. The main reason established during the stakeholders’ consultation is already existing LPG gas connections on the household's ration card.

Providing LPG connections to the ration card holder households entitled for getting subsidized kerosene from the PDS shops will result in a saving of Rs 172 million per annum for the government. The initial cost of providing LPG to the ration card holder households by government will be recovered in less than 4 years in the form of reduced subsidy burden.

The evaluation of the scheme reveals success in providing several benefits to the poor households in terms of convenience, saved cooking time, cleaner indoor air quality and overall better quality of life. On an average, 2 hours per week is found to be saved by the women households with the introduction of LPG as the cooking fuel. This 2 hour time saved also includes the time saved in collection of PDS kerosene from fair price shops. It provides them additional 2 hours per week for family and leisure time. The beneficiaries were overall satisfied with the scheme. Considering the environmental and social benefits enjoyed by the poor households, the initial cost incurred for the scheme by the state Government i.e. Rs. 3,049 per beneficiary to provide free LPG kit and connection, is minimal.

However, the scheme failed to include the poor population who did not hold a ration card and were non-kerosene users relying largely upon traditional solid cooking fuels such as firewood. Now the government is also planning to provide LPG connections to the poor households who all were not covered in the KFD scheme which is a welcome step and will help to realize the true objective of making Delhi a Kerosene Free City. Also, the single

bottled connection prompted the households to resort to using traditional and polluting cooking fuels such as firewood, cow dung cake and kerosene from the black market adding to the indoor air pollution. Therefore, it is recommended to provide tie-up bottled (second small size bottled may be 5 KG, which will save additional cost on the second bottle for the government) connection to the beneficiaries. A sufficient awareness and orientation program to expand the beneficiaries' knowledge on using LPG and its benefits for their cooking needs is also recommended.

The schemes targeting to shift households from kerosene to a cleaner fuel for cooking as well as lighting, show immense potential to be extended not only to major Indian cities but also to rural areas in the form of "Kerosene Free Cities" and "Kerosene Free Villages". At the same time such scheme should be made inclusive in order to realise its true potential in terms of reducing the adversaries of women and children, indoor air pollution and overall benefits to the marginal sections of the society.

References

- Census 2011 data from Government of India.
- Economic Survey 2012-13, Ministry of Finance, Government of India
- Press Note on Poverty Estimates, 2011-12; Planning Commission, Government of India (July 2013)
- International Energy Agency: World Energy Outlook, 2013
- Parliamentary speech, Delhi budget 2012-2013; www.delhi.gov.in
- PPAC (price build up of petroleum products) website www.ppac.org.in
- MoPNG Data from www.indiastat.com
- NCAER(2005),"Public Distribution of Kerosene in India" NCAER, New Delhi
- Report of the Expert Group to review the methodology for estimation of poverty, Planning Commission, Government of India (2009)
- The Hindu, June 17, 2014, <http://www.thehindu.com/news/cities/Delhi/delhi-becomes-first-kerosenefree-city-in-india/article6120837.ece>

ABOUT IRADe

IRADe is an autonomous advanced research institute, which aims to conduct research and policy analysis and connects various stakeholders including government, Non-Governmental Organizations, corporations, academia and financial institutions. Its research covers many areas including energy and power systems, urban development, climate change and the environment, poverty alleviation and gender, food security and agriculture as well as the policies that affect these areas.

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C-80, Shivalik, Malviya Nagar, New Delhi-110017