



## Household Energy Consumption Differentials Among Social Groups in India: Empirical Evidence of Nsso Data

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### ABSTRACT

The aim of the paper is to examine the energy consumption differentials among social groups for cooking and lighting purposes in India by with evidence from four rounds of NSSO data from 1993-94 to 2011-12. The analysis is based on the social profile of the Indian household such as caste and different energy sources for their daily livelihood sustenance in rural and urban pockets of India in general and cooking and lighting purposes in particular. The study further found that firewood and chips continue to remain as the most important source of energy for cooking in the rural pockets of India were 67.3 percent of the households depend upon it. Firewood and chips and LPG are the twin vital sources of energy for cooking in the urban pockets of India. There has been an increase in the use of LPG from 29.6 percent to 68.4 percent of the households and a decrease in the number of households using firewood and chips from 30 percent to 14 percent since 1993-94. There has been an increase in the proportion of households using electricity as major source of lighting from 37 percent to 73 percent in rural and from 83 percent to 96 percent in urban pockets of India since 1993-94. There has been a decrease in the percentage of households from 62 percent to 26.5 percent in rural and 16.5 percent to 3 percent in urban pockets, since 1993-94, using kerosene as the primary source of energy for lighting. Still today kerosene remains the most important source of energy for lighting in the rural pockets of India. It is further found that the marginalized sections of the society used the highest quantum of non-commercial energy sources for cooking as compared to upper sections of the society. The use of electricity for lighting by the marginalized sections has also been increasing simultaneously from 1999-2000 to 2011-12.

### KEYWORDS

India, Energy, Caste, Livelihood sustenance

### Introduction

Energy has played a crucial role in all aspects of the daily livelihood sustenance of human beings as well as the economy as a whole. A large majority of the rural households still depends on biomass fuel particularly fuelwood for cooking and heating. According to NSSO, firewood and chips have been the most important and even a customary sources of energy for cooking used by the households in the rural pockets of India. About 78 percent of the rural households depend upon because of its easy and cheap availability in large quantities in the rural sector (NSSO, 1993-94). During 2011-12, it was estimated that more than two-third (67.3 %) of the rural households used firewood and chips for cooking and heating purposes.

Macauley et al., (1989) have observed that firewood is the major form of energy for household cooking and accounts for 60 percent of the total. For the lowest income groups, firewood accounts for 80 percent of the total household consumption. Even though, it is also used in substantial quantities in higher income households, the middle and average income households use wood as much as 30 percent to 45 percent of the total energy. Dovie et al., (2004) have found that 96 percent of the household gathered and utilized fuelwood for domestic purposes. Obviously, there is a close connection between the type of energy used and the development of the economy. The less developed a country or region is more dependent on firewood and the availability of wood is sometimes taken as a measure of wealth (Cordova, 1992).

A number of researchers have attempted to analyze energy utilization by households taking into account the income, expenditure, gender, caste and the size of households (Macauley et al., 1989; Dovie et al., 2004) at national and in-

ternational levels. But there has been no particular study on energy utilization by different castes for cooking and lighting in the Indian context. In this background the present paper had made an attempt to examine the energy consumption differentials among social groups (castes) for cooking and lighting purposes in India based on the evidence of four rounds in NSSO data during the period 1993-94 to 2011-12.

### Methods and Materials

The National Sample Survey Organization (NSSO) has been carrying out all India surveys on consumer expenditure since its inception in 1950. In order to have an idea about the short-term changes in consumer expenditure pattern, the NSSO began collecting data in its annual rounds also from the 42nd round during 1986-1987 onwards. The fifth quinquennial survey on consumer expenditure was undertaken in the 50th round in July 1993 to June 1994. As a part of it, the NSSO also collected data related to energy used by the Indian households for cooking and lighting in each State and Union Territory. In this round around 115354 households, spread over 6951 sample villages and 4650 sample blocks were interviewed. The sixth survey was conducted in the 55th round during July 1999 to June 2000. A part of the survey deals with the distribution of households based on occupational type, social groups, size and class of land possessed for each primary source used for cooking and lighting purposes. The survey is spread over 6046 villages and 4116 urban blocks covering a total of 120309 households. The seventh quinquennial consumer expenditure survey among Indian households was carried out by the NSSO during the 61st round covering the period from July 2004 to June 2005. Information on energy sources used for cooking and lighting was collected as part of the survey. The survey was spread over 7999 villages and

4602 urban blocks covering 79298 rural and 45346 urban sample households.

Very recently, the ninth survey was conducted in the 68th round during July 2011 to June 2012. The survey covered 101651 sample households in 7469 villages and 5268 urban blocks spread over the entire country. The present paper has made an attempt to analyze the energy consumption differentials for cooking and lighting purposes by social groups in India in these four rounds, in general, and recent three rounds, in particular, in both rural and urban pockets. The simple percentage analysis was used by the researcher for analysis and discussion.

**Results and Discussion**

The analytical paper is divided into two sections. The first section deals with the primary source of energy used by the Indian households, in general, and among social groups, in particular, exclusively for cooking purpose and the second section is devoted to the use of primary source of energy for lighting purpose by the Indian households, in general, and among social groups, in particular, in both rural and urban pockets of India.

**Primary source of energy for cooking**

This section is devoted to the primary source of energy used by the Indian households for cooking by different social

groups. A study conducted by Amulya Kumar et al., (1999) has observed that only about 50 percent of the Indian energy consumption was met from commercial energy sources and the remaining 50 percent from non-commercial sources such as firewood, dung cakes and agricultural wastes. It contributes to the extent of 65 percent firewood, 15 percent dung cake and 2 percent agricultural wastes. Energy is an indispensable component of material prosperity and a source of many of the largest impacts of human beings on their environment. Rural population obtains 90 percent of cooking energy from bio-fuels such as fuelwood, crop residues and animal dung.

Table (1) shows that the use of firewood by the Indian households for cooking still plays an important role in the rural as well as in the urban pockets of India. Above sixty percent of the households in the rural areas, in general, and the rural poor, in particular, depend on firewood as their primary source for cooking purposes. However, in rural households use of the firewood for cooking has declined from 78.2 percent in 1993-94 to 67.3 percent in 2011-12. People's dependence on commercial sources such as LPG and kerosene for cooking has been increasing from just 2 percent to 15 percent and 0.2 per cent to 0.9 percent respectively from 1993-94 to 2011-12. There has not been much dependence of people on kerosene for cooking by the rural households as found out in these four rounds of NSSO data during 1993-94 to 2011-12.

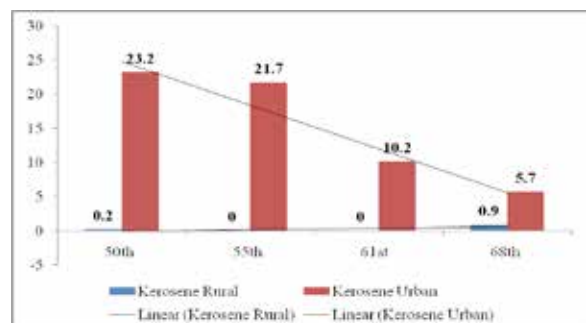
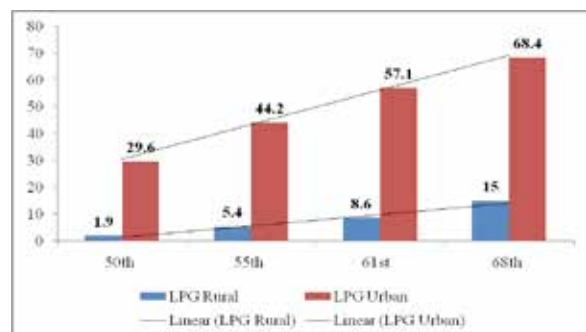
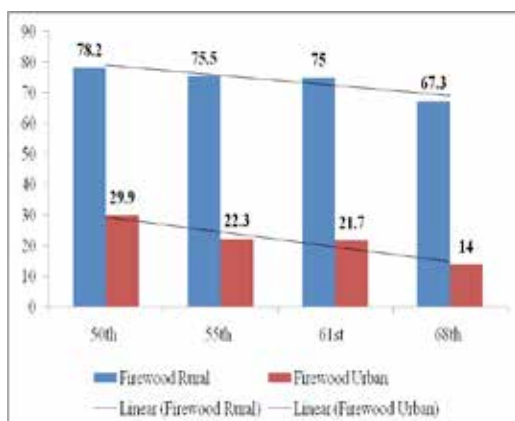
**Table 1: Percentage of households using different sources of energy for cooking in India**

NSSO rounds	Rural				Urban			
	Firewood	LPG	Kerosene	Surveyed HHS	Firewood	LPG	Kerosene	Surveyed HHS
50th (1993-94)	78.2	1.9	0.2	69,206	29.9	29.6	23.2	46,148
55th (1999-2000)	75.5	5.4	0.0	71,385	22.3	44.2	21.7	48,924
61st (2003-04)	75.0	8.6	0.0	79,298	21.7	57.1	10.2	45,346
68th (2011-12)	67.3	15.0	0.9	1,19,378	14.0	68.4	5.7	81,935

Source: NSSO data, Report no.410/2, 464/55, 511/6 & 567/68

The proportion of household's dependence on firewood for cooking by the urban households accounted for about 30 percent in 1993-94. It had declined to only 14 percent in 2011-12. The dependence on LPG for cooking purpose by the urban households significantly increased two-fold in these four rounds in India. It was estimated to be 29.6 percent in 1993-94 and 68.4 percent in 2011-12. While use of kerosene for cooking accounted for about 23.2 percent in 1993-94 and it declined to 5.7 percent in 2011-12.

**Figure 1: Trends in use of various energy resources for cooking in Indian households**



Source: NSSO data, Report no.410/2, 464/55, 511/6 & 567/68

The above diagrams show that the trends in the use of various energy resources by the Indian households for cooking in rural and urban pockets of India.

**Table 2: Firewood and chips as primary source for cooking among social groups in India**

Social groups	Rural			Urban		
	55 <sup>th</sup>	61 <sup>st</sup>	68 <sup>th</sup>	55 <sup>th</sup>	61 <sup>st</sup>	68 <sup>th</sup>
ST	90.5	90.0	87.0	39.0	36.2	23.9
SC	76.7	77.2	69.8	37.9	34.7	23.0
MBC	75.7	74.2	66.4	30.7	28.8	17.7
Others	69.2	68.1	57.0	12.2	11.1	6.5
All	75.5	75.0	67.3	22.3	21.7	14.0

Source NSSO data, Report no.464/55, 511/6 & 567/68

Table 2 explains that firewood used by different social groups for cooking practices in three rounds of NSSO data i.e. 55th round, 61st round and 68th round in both rural and urban pockets of India. Among social groups, the dependence on firewood and Chips by the scheduled tribe was much higher than the other social groups in the rural pockets of India. It was estimated that 90.5 percent in 1999-2000 and it slightly declined to 87 percent in 2011-12. Whereas scheduled caste community, the dependence of firewood and chips was 76.7 percent in 1999-2000 and it declined to around 70 percent in 2011-12.

But in the case of Most Backward Community (MBC), it declined from 76 percent to 66 percent during the period of 1999-2000 to 2011-12. The dependence on firewood and chips for cooking by 'others' category household was estimated at 69 percent in 1999-2000. It declined to 57 percent in 2011-12. In the urban pockets of India, dependence on firewood and chips as primary source for cooking by the poor sections (ST and SC) of the society was high as compared to the upper sections (MBC and Others) of the society.

**Table 3: Kerosene as primary source for cooking among social groups in India**

Social groups	Rural			Urban		
	55 <sup>th</sup>	61 <sup>st</sup>	68 <sup>th</sup>	55 <sup>th</sup>	61 <sup>st</sup>	68 <sup>th</sup>
ST	1.3	4.0	0.5	16.3	8.2	7.0
SC	1.9	1.2	1.1	24.4	15.3	8.5
MBC	2.6	1.4	0.9	25.3	10.4	5.3
Others	3.9	1.5	0.8	19.4	8.5	5.2
All	2.7	1.3	0.9	21.7	10.2	5.7

NSSO data, Report no.464/55, 511/6 & 567/68

Table (3) indicates that in rural areas, the percentage of households depending on kerosene for cooking by all social groups was much low as compared with urban areas. In urban areas, the percentage of households depending on kerosene was higher in the case of MBC category followed by SC category than that of all other social groups in India. Around one fourth (25.3 percent) of the MBC category households depending on kerosene for cooking was observed in 1993-94 and it came down to less than 10 percent (5.3 percent) in 2011-12. It means that about 20 percentage points of drop of household's dependence on kerosene by MBC was observed during 1993-94 to 2011-2012. While in SC category, it was 24.4 percent in 1993-94 and it declined to 8.5 percent in 2011-12. It shows that around 15.9 percentage points of drop of SC category households on kerosene was observed during these three rounds of NSSO data.

Table (4) shows that the percentage of households depending on LPG for cooking in the rural pockets of India has increased at lower rate as compared to the rate of improvement in urban pockets of India. Among the social groups in rural areas, the 'others' category households depend more on LPG as primary source for cooking as compared to all other social groups in rural pockets of India during 1999-2000 to 2011-12. The improvement was by 11.1 percent to 23.3 percent during 1999-2000 to 2011-12.

**Table 4: LPG as primary source for cooking among social groups in India**

Social groups	Rural			Urban		
	55 <sup>th</sup>	61 <sup>st</sup>	68 <sup>th</sup>	55 <sup>th</sup>	61 <sup>st</sup>	68 <sup>th</sup>
ST	1.3	2.7	5.3	27.9	41.1	51.6
SC	1.6	3.7	8.9	21.4	36.5	56.8
MBC	4.1	8.0	16.0	33.3	50.8	66.0
Others	11.1	16.0	23.3	57.6	69.7	76.2
All	5.4	8.6	15.0	44.2	57.1	68.4

NSSO data, Report no.464/55, 511/6 & 567/68

In urban areas, the percentage of households depending on LPG as primary source of cooking was much higher than the rural areas during 1999-2000 to 2011-12. For instance, the percentage of households depending on LPG by ST was 27.9 percent in 1999-2000 and it increased to 51.6 percent in 2011-12 and the same by SC category was 21.4 percent to 56.8 percent in the same period. There has been significant improvement on LPG as observed in these two marginalized groups during these three rounds. The extent of increase was observed during this period was 35.4 percentage points in the case of SC and 23.7 percentage points in the case of ST on LPG for cooking purpose alone. There has been two times improvement in the dependence on LPG by MBC category and 18.6 percentage points of improvement on LPG by 'others' category as observed during the same periods in the urban pockets of India. Macauley et al., (1989) have found out that LPG is used in small number of people with lowest incomes and it includes 12 to 18 percent of the total energy used by middle income households and it amounts to more than 25 percent of all users among the above average income households.

**Primary Source of Energy for Lighting**

The primary source of energy for lighting is kerosene and electricity in rural and urban pockets of India. It indicates that the households used kerosene for lighting has continuously declined as many shifted to electricity for lighting during 1993-94 to 2011-12.

**Table 5: Percentage of households using Kerosene and Electricity for lighting in India**

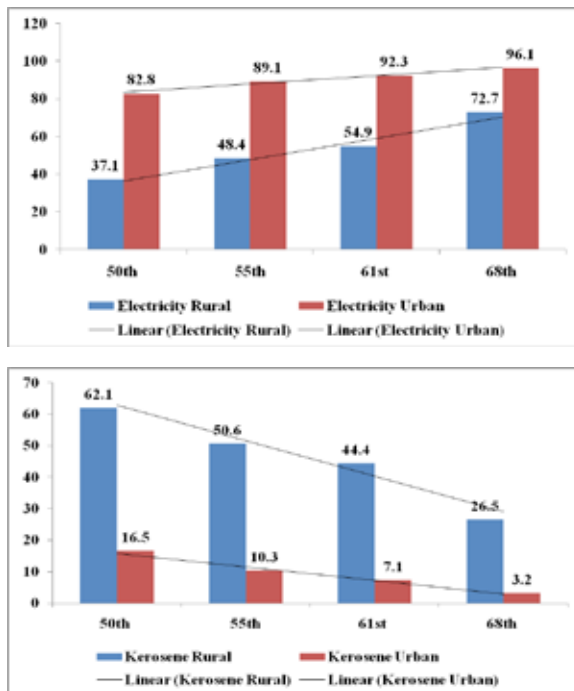
Round	Rural			Urban		
	Kero-sene	Electric-ity	Sur-veyed HHs	Kero-sene	Electric-ity	Surveyed HHs
50 <sup>th</sup> (1993-94)	62.1	37.1	69206	16.5	82.8	46148
55 <sup>th</sup> (1999-2000)	50.6	48.4	71385	10.3	89.1	48924
61 <sup>st</sup> (2003-04)	44.4	54.9	79298	7.1	92.3	45346
68 <sup>th</sup> (2011-12)	26.5	72.7	119378	3.2	96.1	81935

Source: NSSO data, Report no.410/2, 464/55, 511/6 & 567/68

In rural India, the use of kerosene for lighting by the households was 62.1 percent in 1993-94 and it declined to 26.5 percent in 2011-12. The rural households depending on electricity for lighting purpose were estimated at 37.1 percent in 1993-94. But it increased to 72.7 percent in 2011-12. In the last two decades, the number of households using kerosene for lighting has declined at 35.6 percentage points as many shifted over to electricity for lighting during the period of 1993-94 to 2011-12.

The diagram below indicates the trends in the use of twin most important energy resources by the Indian households for lighting in rural and urban pockets of India.

**Figure 2: Trends in use of various energy resources for lighting by the Indian households**



**Source: NSSO data, Report no.410/2, 464/55, 511/6 & 567/68**

In urban pockets of India, the number of households depending on kerosene as primary source for lighting declined by 16.5 percent in 1993-94 to 3.2 percent during 2011-12. However, the extent of household's dependence on electricity for lighting increased from 82.8 percent in 1993-94 to 96.1 percent in 2011-12. It was estimated that 13.3 percent of the urban households as switched over from kerosene to electricity for lighting purpose during the same periods.

Table 6 shows that in the rural pockets of India, more than sixty percent (61.3%) of the ST households depended on kerosene as primary source for their lighting purpose in 1999-2000 and the dependence of SC category was 59.6 percent. But these proportions declined to 27.5 percent and 32.3 percent by ST and SC groups respectively during 2011-12. Half of the MBC category households were depends on kerosene as primary source for lighting in 1999-2000 and it came down to 19.4 percent in 2011-12. Around forty one percent in the 'others' category households depends on kerosene for lighting in 1999-2000 and it has declined to 19.4 percent in 2011-12.

**Table 6: Usage of Kerosene as primary source for lighting among social groups in India**

Social groups	Rural			Urban		
	55 <sup>th</sup>	61 <sup>st</sup>	68 <sup>th</sup>	55 <sup>th</sup>	61 <sup>st</sup>	68 <sup>th</sup>
ST	61.3	56.1	27.5	20.6	14.9	4.5
SC	59.6	52.0	32.3	19.7	14.1	5.3
MBC	50.3	43.0	27.3	12.5	8.2	4.0
Others	40.8	35.3	19.4	5.7	3.5	1.6
All	50.6	44.4	26.5	10.3	7.1	3.2

**NSSO data, Report no.464/55, 511/6 & 567/68**

But in the urban pockets of India, dependence on kerosene for lighting was less in the rural pockets of India. For instance, less than one fourth of the households belong to ST and SC category depended on kerosene for lighting purpose but it was 12.5 percent and 5.7 percent respectively by 'MBC' and 'Others' categories in 1999-2000. The extent of the households' dependence on kerosene by all social groups declined to less than 10 percent in 2011-12 as shown in table 6.

**Table 7: Electricity as primary source for lighting among social groups in India**

Social groups	Rural			Urban		
	55 <sup>th</sup>	61 <sup>st</sup>	68 <sup>th</sup>	55 <sup>th</sup>	61 <sup>st</sup>	68 <sup>th</sup>
ST	37.4	42.7	71.1	76.8	83.8	94.5
SC	39.3	47.3	66.8	79.4	84.8	93.9
MBC	48.8	56.3	72.1	86.9	91.4	95.4
Others	58.3	64.3	80.1	93.7	96.1	97.8
All	48.4	54.9	72.7	89.1	92.3	96.1

**NSSO data, Report no.464/55, 511/6 & 567/68**

The extent of households using electricity by the ST category in the rural pockets of India was 37.4 percent in 1999-2000. It increased to 71.1 percent in 2011-12. In urban areas, it increased from 76.8 percent in 1999-2000 to 94.5 percent in 2011-12. The proportion of SC households using electricity for lighting was 39.3 percent in 1999-2000. It increased to 66.8 percent in 2011-12. The use of electricity for lighting by the same caste in urban areas was 79.4 in 1999-2000 and that increased to 93.9 percent in 2011-12. Whereas the proportion of MBC households using electricity for lighting in the rural areas accounted for about 48.9 percent in 1999-2000. It increased to 72.1 percent in 2011-12. In the urban areas, it was 86.9 percent in 1999-2000. It went up to 95.4 percent in 2011-12. The percentage of households using electricity for lighting particularly by 'other' castes was estimated to be 58.3 percent in 1999-2000. It went up to 80.1 percent in 2011-12. In the urban areas, it was estimated at 93.7 percent in 1999-2000 and 97.8 percent in 2011-12. The overall data reflect that the use of electricity by the low caste community (SC and ST) was much low in rural as well as urban pockets of India compared to MBC and 'other' communities for lighting in India.

**Conclusion**

Energy is an indispensable component of material prosperity and it influenced human beings and their environment. Rural population obtains 90 percent of the cooking energy from bio-fuels such as firewood, crop residues and animal dung. At the time of short supply or prohibitive cost which influenced cooking, heating and lighting patterns. A majority of India's rural population still uses firewood and chips for cooking purposes. Richard Hosier (1985) reveals that energy consumption varies between those individuals who have access to wages and those who have continue to live off the land. High level usage of wood as fuel is linked to deforestation, soil erosion, increased stress on rural women and increased inequality among inhabitants in rural areas. The study found that Firewood and chips continue to remain as the most important source of energy for cooking in the rural pockets of India, 67.3 percent of the households depend upon it. Firewood and chips and LPG are the twin vital sources of energy for cooking in the urban pockets of India. There has been an increase in the use of LPG from 29.6 percent to 68.4 percent of the households and a decrease in the number of households using firewood and chips at 30 percent to 14 percent since 1993-94. There has been an increase in the proportion of households using electricity as major source of lighting from 37 percent to 73 percent in rural and from 83 percent to 96 percent in urban pockets of India since 1993-94. There has been a decrease in the percentage of households from 62 percent to 26.5 percent in rural and 16.5 percent to 3 percent in urban areas, since 1993-94, using kerosene as primary source of energy for lighting. Still today kerosene remains the most important source of energy for lighting in the rural pockets of India. It was further found out that the marginalized sections of the society used the highest quantum of non-commercial energy resources for cooking as compared to upper sections of the society. The use of electricity for lighting by the marginalized sections has also increased simultaneously from 1999-2000 to 2011-12.

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