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CONSUMPTION PATTERN OF ENERGY SOURCES IN RURAL AND URBAN HOUSEHOLDS

KEYWORDS: Energy sources, energy consumption, household activities

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ABSTRACT *Household energy consumption accounts for a major part of total energy consumption being about 50 per cent in the developing countries. The present investigation was undertaken to explore the energy consumption pattern in rural and urban households of Ludhiana. The study was conducted on 60 rural and 60 urban respondents and the results showed that majority of the rural as well as urban respondents used LPG and electricity as major energy sources in their homes as these were readily accessible to them and are neat and clean sources of energy.*

INTRODUCTION

Fuel wood, agricultural waste and cattle dung form the major sources of energy for rural India and most of the urban Indian population consumes energy from coal, petroleum, natural gas (CNG), hydel power (hydroelectricity), sun, wind and nuclear power. Household energy consumption accounts for a major part of total energy consumption being about 50 per cent in the developing countries. In a household, the energy is required primarily for cooking and lighting. Cooking consumes the largest amount of total energy consumption in a household. The household energy needs take up a substantial portion of the resources of many households. This sector of energy consumption is not only very large, but also draws heavily on fuels that have important consequences for economic development for example, fuel wood and dung. Overuse of these fuels may create severe environmental problems and affect agricultural productivity. Therefore, the present study was undertaken to explore the energy consumption pattern in rural and urban households of Ludhiana district.

MATERIAL AND METHODS

The study was conducted in two urban localities namely; Punjab Agricultural University Campus and Kitchlu Nagar of Ludhiana city and two villages namely; Sawaddi Kalan and Birk Sidhwan Bet block of Ludhiana district. From each of these localities and villages 30 households were randomly selected; thus the sample comprised of 120 households. Interview method was used for getting the responses of the respondents.

RESULTS AND DISCUSSION

Energy sources used in homes

It can be observed from the **Fig. 1** that urban respondents didn't use firewood as energy source for any of the household activity. However, 60 per cent rural respondents used firewood for cooking and water heating and 16.67 per cent used it for heating purpose. It can be further observed from **Table 1** that on an average, they used 1.35 quintals of firewood per month. This finding is in line with the findings of Gnaman and Manan (1982) who also reported that energy requirements of rural Indian homes were met from energy sources like firewood and animal dung. Besides, 38.33 per cent rural respondents used firewood as an energy source because it is 'available free of cost' to them, 26.67 per cent used it because they have become 'used to it', 25 per cent used because firewood is 'readily available' to them, 21.67 per cent respondents used firewood because they 'can't afford' other energy sources and 13.33 per cent found firewood cheaper than other energy sources. Kumara and Dak (1995) also found that firewood was the major source of household energy consumption in rural households which accounted for 50 per cent of total non-commercial energy.

Cattle dung cakes were also not used by urban respondents but were very commonly used in rural families. A large number of rural respondents (85 per cent) used cattle dung cakes for heating water and 71.67 per cent used them for cooking. On an average each rural family used about 263.5 kg of cattle dung cakes each month (**Table 1**). This is in conformity with the findings of Bewket (2003) who also indicated that fuelwood and cattle dung accounted for nearly 100 per cent of the domestic energy consumption in rural households. Besides, 45 per cent rural respondents used them because of their 'free of cost availability' as they themselves prepare the dung cakes at home. Another 41.67 per cent of respondents who mostly buy them find cattle dung cakes 'relatively cheap', 36.67 per cent used them because they couldn't afford other energy sources and 30 per cent used them because they have become 'used to it' (**Table 2**). One fourth of respondents used them because they are 'readily availabl'e' and 1.67 per cent respondents found use of cattle dung cakes 'safe for use'.

All the urban respondents and 91.67 per cent of their rural counterparts used LPG for cooking activities. For the purpose of water heating it was used by 6.67 per cent rural and 36.67 per cent urban respondents respectively. On an average each rural family used 0.70 cylinder per month and each urban family used 1.35 cylinder per month. Wijayatunga and Attalage (2002) also observed that urban sector cooking is largely dominated by LPG while rural sector cooking is confined mainly to biomass.

A large number of respondents i.e 81.67 and 86.67 per cent of rural and urban respectively used LPG as an energy source because they found it 'neat and clean'. Less than half (46.67 per cent) rural and 81.67 per cent urban respondents used LPG as an energy source because it is 'readily available' to them, which may be because in most of the cases it is delivered at home. Five per cent rural and 78.33 per cent urban respondents stated that they had be-

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come 'habitual of using' LPG as an energy source. LPG is 'safe for use' was the reason given by 1.67 per cent rural and 51.67 per cent urban respondents. More than half i.e 58.33 per cent rural respondents considered LPG as a fast source of energy.

Kerosene oil was found to be used as an energy source for cooking food by 36.67 per cent rural and 3.33 per cent urban respondents whereas, 33.33 per cent rural and 3.33 per cent urban respondents used kerosene for water heating. Only 6.67 per cent rural respondents used it for heating purpose. On an average each rural and urban family used about 5 litres of kerosene oil every month. Anozie et al (2007) found that fuel wood is the predominant energy source for cooking in the rural areas while kerosene is the predominant energy source in the urban areas whereas, the findings of present study show equal usage of kerosene oil in rural as well as urban category.

Only 3.33 and 31.67 per cent urban and rural respondents respectively used kerosene oil because they find it 'relatively cheap'. 'Ready availability' as a reason for using kerosene oil was mentioned by only 6.67 per cent of rural respondents. All the respondents in rural as well as urban category used electricity for lighting their house and for cooling purpose in summers and 83.33 per cent urban respondents also used electricity for water heating. Eighty per cent used for cooking activities and 53.33 per cent used for heating the rooms. On an average rural respondents used 308.52 kWh and urban respondents used 819.58 kWh of electricity per month. All the rural respondents and 88.33 per cent urban respondents used electricity as it is readily available in their homes. 35 per cent urban respondents considered electricity as a neat and clean source of energy and 11.67 per considered it as safe for use. A large number of respondents i.e 58.33 and 96.67 per cent rural and urban respondents respectively used petrol in their vehicles. On an average rural respondents used 22.00 litres and urban respondents used 46.61 litres of petrol every month. Diesel was used by 11.67 per cent rural respondents for their agricultural implements and 20 per cent urban respondents for their vehicles and on an average rural respondents used 167.86 litres and urban respondents used 75.83 litres of diesel every month. More consumption of diesel by rural households was due to their farming related activities. Hall *et al* (1992) observed that with the promotion of commercial energy what is often neglected is the high dependence of developing countries on traditional biomass fuels when as much as 38 per cent of the total energy is provided by traditional biomass fuels.

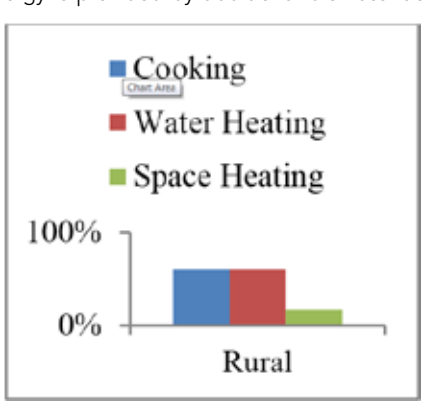

Fig. 1: Distribution of respondents according to purposes of using firewood

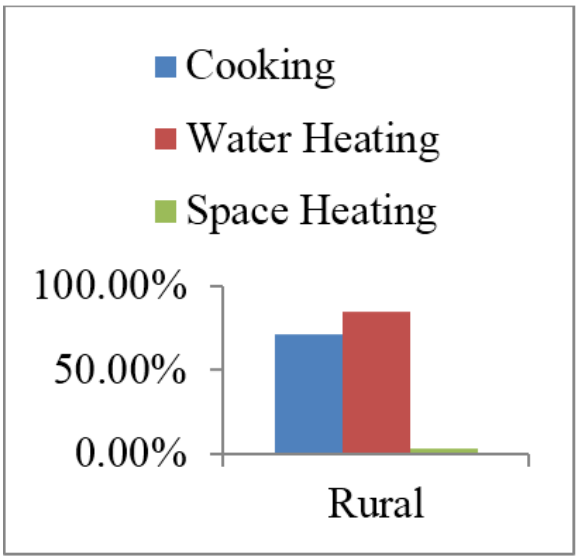

Fig. 2: Distribution of respondents according to purposes of using Cattle Dung Cakes

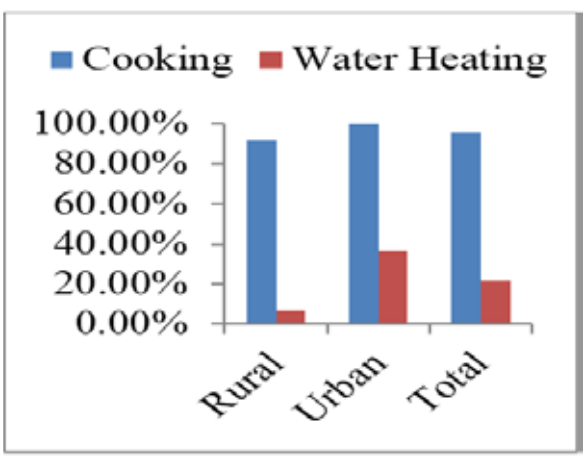

Fig. 3: Distribution of respondents according to purposes of using LPG

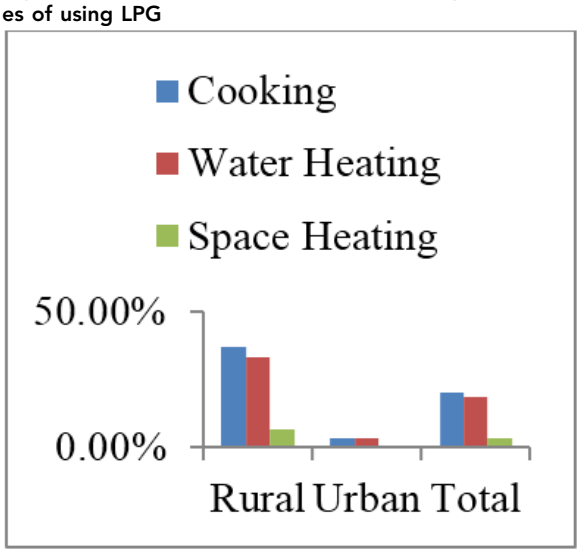

Fig. 4: Distribution of respondents according to purposes of using Kerosene oil

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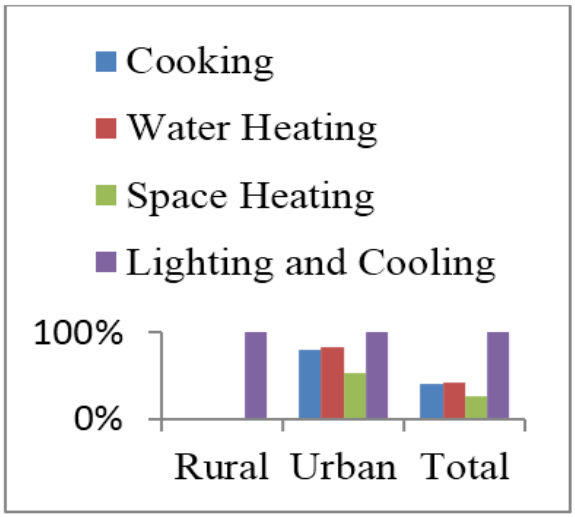

Fig. 5: Distribution of respondents according to purposes of using Electricity

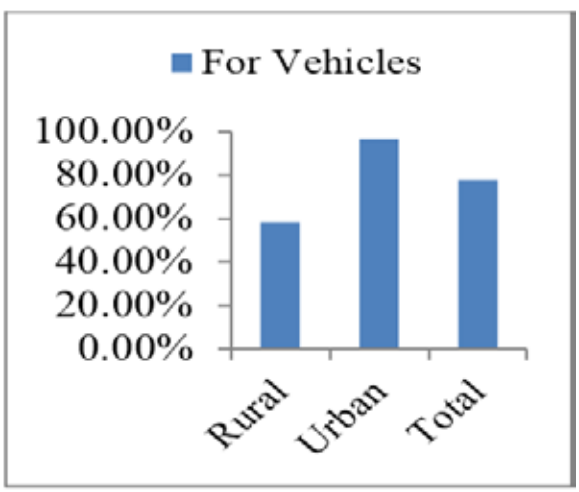

Fig. 6: Distribution of respondents according to purpose of using Petrol

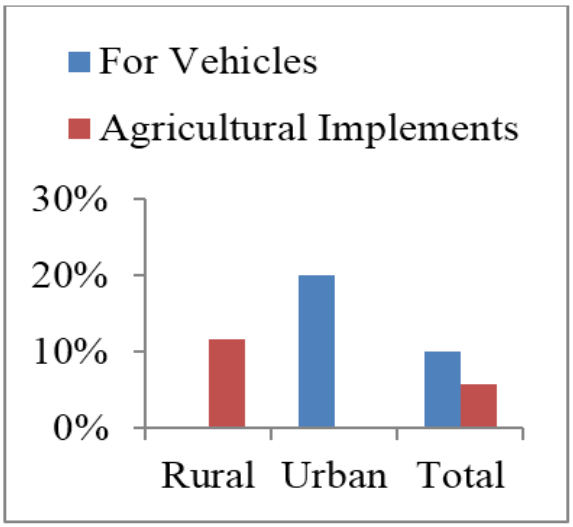

Fig. 7: Distribution of respondents according to purposes of using Diesel

Table 1: Average consumption of various energy sources per month

Energy sources	Respondent Category					
	Rural		Urban		Total	
	Mean	SD	Mean	SD	Mean	SD
Firewood (Quintals)	1.35	(0.00)	0.00	(0.00)	0.67	(0.00)
Cattle dung cakes (kg)	263.50	222.90	0.00	(0.00)	131.81	111.45
LPG (Cylinder)	0.70	(0.28)	1.35	(0.57)	1.02	(0.43)
Kerosene oil (Litres)	5.00	(0.00)	5.00	(0.00)	5.00	(0.00)
Electricity (kWh)	308.52	189.80	819.58	490.27	564.05	340.04
Petrol (Litres)	22.00	21.85	46.61	29.69	34.31	25.77
Diesel (Litres)	167.86	2227.17	75.83	62.77	121.85	144.97

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Table 2: Distribution of respondents according to the reasons for using different types of energy sources

Reasons	Respondent Category			
	Rural	Urban	Z-value	**Total**
For Firewood:				
Free of cost availability	23(38.33)	0(0.00)	-	23(19.17)
Habitual	16(26.67)	0(0.00)	-	16(13.33)
Readily accessible/ available	15(25.00)	0(0.00)	-	15(12.50)
Can't afford other sources	13(21.67)	0(0.00)	-	13(10.83)
Relatively cheap	8(13.33)	0(0.00)	-	8(6.67)
2. For Cattle Dung Cakes :				
Free of cost availability	27(45.00)	0(0.00)	-	27(22.50)
Habitual	18(30.00)	0(0.00)	-	18(15.00)
Readily accessible/ available	15(25.00)	0(0.00)	-	15(12.50)
Can't afford others	22(36.67)	0(0.00)	-	22(18.33)
Relatively cheap	25(41.67)	0(0.00)	-	25(20.83)
Safe for use	1(1.67)	0(0.00)	-	1(0.83)
3- For LPG:				
Habitual	3(5.00)	47(78.33)	8.15**	50(41.67)
Readily accessible/ available	28(46.67)	49(81.67)	4.00**	77(64.17)
Relatively cheap	0(0.00)	5(8.33)	-	5(4.17)
Safe for use	1(1.67)	31(51.67)	6.19**	32(26.67)
Neat and clean	49(81.67)	52(86.67)	0.75	101(84.17)
Eco-friendly	0(0.00)	3(5.00)	-	3(2.50)
Fast	35(58.33)	0(0.00)	-	35(29.17)
4. For Kerosene Oil:				
Habitual	2(3.33)	2(3.33)	-	4(3.33)
Readily accessible/ available	4(6.67)	0(0.00)	-	4(3.33)
Can't afford others	3(5.00)	0(0.00)	-	3(2.50)
Relatively cheap	19(31.67)	2(3.33)	4.08**	21(17.50)
5. For Electricity:				
Readily accessible/ available	60(100.00)	53(88.33)	2.73**	113(94.17)
Safe for use	0(0.00)	7(11.67)	-	7(5.83)
Neat and clean	0(0.00)	21(35.00)	-	21(17.50)

Note: Figures in parentheses indicate percentages

** Significant at 1 per cent level

* Significant at 5 per cent level

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