



## Extent of Fuel wood Scarcity and Households Responses

Varinder Singh Waris<sup>1</sup>, Prakash C. Antahal<sup>2</sup> and Som Raj<sup>3</sup>

<sup>1</sup>Department of Economics, University of Jammu, Jammu and Kashmir, INDIA

<sup>2</sup>Economics, Department of Economics, University of Jammu, Jammu and Kashmir, INDIA

<sup>3</sup>Department of Economics, University of Jammu, Jammu and Kashmir, INDIA

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### Abstract

*Fuelwood is wood which is mostly used for the domestic cooking purpose, especially in the hill areas and is derived from forests of various kinds in various forms. However, the gap between demand for and supply of fuelwood has been widened in the past few years, which lead to the problem of fuelwood scarcity. The demand for fuelwood has increased due to various factors like increase in population, increase in cost of modern fuels, poverty and non-availability of other alternative fuels whereas the supply of fuelwood is limited to some extent. This paper try to measure the extent of fuelwood scarcity, level of fuel switching and other alternatives to fuelwood scarcity being adopted by the households in Panchari and Chenani Blocks of District Udhampur of Jammu and Kashmir State. Sources of fuelwood, types and quality of fuelwood and distance covered for its collection by the households are being used for measuring the extent of fuelwood scarcity. Similarly, for measuring fuel switching level and other responses to fuelwood scarcity, the number of households using LPGs, monthly consumption of LPG along with reasons for switching to LPG etc. taken into consideration. In order to find out other alternatives to fuelwood scarcity, monthly consumption of Kerosene, Electricity, Crop Residue and Dung has been taken.*

**Keywords:** Alternative fuel, consumption, fuelwood scarcity, fuel switching.

### Introduction

Fuelwood simply means wood used as fuel for flame. It may belong to any specie of a tree and can be in any form, i.e. branches, roots, logs, leaves, etc., cut or split or not cut or split, but intended to be cut or split into a size appropriate for use as fuel for fires in stoves, chullahas, fireplace or in other wood burning devices for cooking, heating and lighting. It is the forest commodity produced in large quantities and is the main component of rural domestic energy in India<sup>1</sup>.

In India a total of 49 percent household used fuelwood for cooking purpose with 62.50 percent rural household and 20.10 percent urban households. The province of Jammu and Kashmir compared to the neighbouring provinces of Punjab and Haryana has an adequate forest cover. But the dependence on forests for fuel wood in JandK especially in rural regions is far larger than in the case of Punjab and Haryana because of the economic status of the people, fuel switching in rural areas, etc. In the province of Jammu and Kashmir a total of 58.90 percent household used followed with 73.80 percent household in rural household and 15.70 percent in an urban home<sup>2</sup>. However, in district Udhampur of Jammu and Kashmir state a total of 76.80 percent household used followed with 89.60 percent rural household and 16.50 percent urban households<sup>3</sup>. when there is access to forest stock, people tend to substitute private fuels with forest fuelwood and, even in case of increasing scarcity and more collection time, the extraction does not stop. There is a need to understand this extraction from the perspective of the

people who are using the forest resources to design a solution that is appropriate and effective, and so that we may be able to present that solution in a way that is acceptable to them<sup>4</sup>.

Most of fuelwood is derived from forests of various kinds, with trees grown on own farmland, forests on common land, reserve forests etc. As we know that supply of fuelwood is limited to some extent but the demand for it has been increasing due to various reasons like poverty, increasing costs of modern fuels, non availability of alternative fuels and increasing population etc especially in the hill areas. The widening of gap between demand and supply of fuelwood led to the problem of fuelwood scarcity. Fuelwood scarcity places major demands on women and children's time, limiting their opportunities to obtain an education and undertake income generating activities.

The extent of fuelwood scarcity can be measured through various types and quality of fuelwood being used by the households, different sources of fuelwood and distance covered by households to collect fuelwood etc. If modern fuels are to have an impact on combating indoor air pollution and other problems associated with the use of traditional fuels, there should be displacement of solid fuels to a significant extent. The population of partial fuel switchers does not generally increase in tandem with the rise in modern fuel use, this suggest that uptake of modern fuels in urban areas helps displace solid fuels<sup>5</sup>.

In the areas where fuelwood is scarce people try to use other alternatives like LPG, Kerosene, Electricity, Crop residue, and Dung to cook food depending upon the economic conditions of people and availability of other alternative fuels. As it is seen in the study area where fuelwood is scarce, people cover a distance of 2 to 3 kilometres to collect fuelwood but they still prefer fuelwood due to the poor economic conditions and non-availability of other alternative fuels.

**Objective:** i. To study the extent of fuelwood scarcity. ii. To analyze the level of fuel switching and other responses by the households to fuelwood scarcity.

### Methodology

In order to study the level of fuel switching, extent of fuelwood scarcity and responses to fuelwood scarcity by the households in rural hilly areas, Panchari and Chenani Blocks of Udhampur district are selected for intensive investigation. From the selected blocks (Block Panchari and Block Chenani) a total of 300 households is selected for the purpose of collecting the primary data, selecting 150 households from each Block and from each Block 5 villages are selected and from each village 30 households are selected. Respondents are selected in such a way as to fairly represent those fuelwood scarcity and level of fuel switching. The study is based on primary data. Primary data are collected through a structured interview schedule designed for the purpose. The primary data is also collected by personal meetings, observations and discussions with respondents. The data from the households of the study area is collected by direct personal contact. In order to know the interventions aimed at the regeneration of forests for fuelwood have been successful, the functionaries/officials of such department would be contacted to get their opinions on the issues related to the problem of fuelwood scarcity and reason for the failure of the government. In order to achieve desired objectives the data thus collected is tabulated and analysed in such a way that it fulfil the given objectives.

**Extent of Fuelwood Scarcity:** There are is large number of variables to find the extent of fuelwood scarcity but the author has taken some common variables like distance, sources and quality of fuelwood.

**Sources of Fuelwood:** The most important sources of fuelwood in both blocks are forest on common land, reserve forest and own farmland which are shown below in table-1.

It is evident from the above table- 1 that households in all the selected villages of Panchari and Chenani blocks depends on more than one source for collecting fuelwood for domestic purpose. For example  $(203+260+103)-(300)=266$  households depends on more than one source .However, in aggregate a total of 46 percent households depend on 'Forest on Village common land' for collecting fuelwood and 36 percent households depend on ' Reserve Forests' but only 18 percent households depend on 'Own Farmland' for fuelwood. The low percentage of households

depend on Own Farmland and high percentage of households depend on Forest on Village common land and Reserve Forest for fuelwood collections indicates that fuelwood in nearby areas/own farmland has been declined and they are highly intervene in Forest on common land and Reserve Forests.

**Table-1**  
**Source of Fuelwood**

S. No	Block Panchari	Own Farmland	Forest on Common Land	Reserve Forest
1	Basnote	13(22)	28(46)	19(32)
2	Chulna	7(15)	30(65)	9(20)
3	Damnate	5(10)	23(43)	25(47)
4	Meer	13(22)	26(43)	21(35)
5	Moungri	11(19)	28(49)	18(32)
	Block Chenani			
6	Karian	9(16)	24(44)	22(40)
7	Satayalta	14(23)	26(44)	20(33)
8	Sewna	11(19)	27(46)	21(35)
9	Sudhmahadev	8(15)	21(40)	24(45)
10	Tandar	12(20)	25(41)	24(39)
	Total	103(18)	260(46)	203(36)

Source: Survey Data. In table the figures which are shown within brackets are in percentage form.

**Quality of fuelwood:** There are variety of types and qualities of fuelwood used by the respondent households in the study area. Some of the types of fuelwood used by the households are Air dry branches, Air dry stems, Air dry roots, Wet branches, Wet stems and Wet roots etc. The uses of these various types of fuelwood by the different households provide us with an idea about the extent of fuelwood scarcity in the given area. As it is a commonly found in the villages of the selected Blocks , the area where fuelwood is scarce households use wet roots, stems, branches along with dry branches, stems and roots which is shown in table-2 below.

In the study area all households prefer to use air dry branches along with other types of fuelwood. In 66 percent households air dry stems are used while air dry roots are used in 46 percent households. Similarly, 27 percent households use wet branches, 13 percent households use wet stems and 11 percent households used wet roots for cooking purpose.

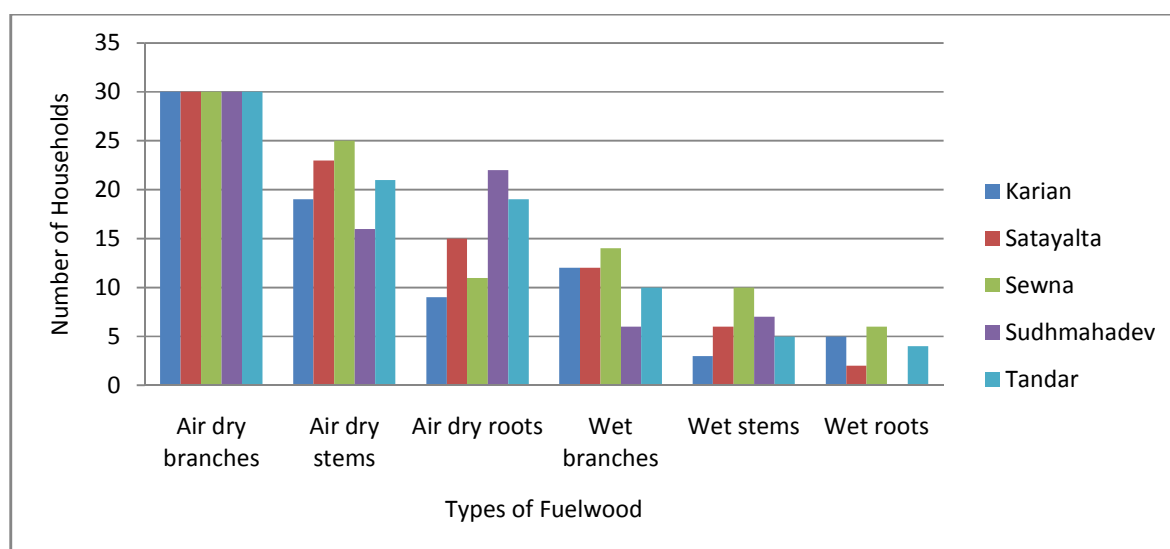
In block Panchari, air dry branches are used in 100 percent households as a fuelwood while air dry stems are used in 63 percent households. Similarly air dry roots, wet branches, wet stems and wet roots are used in 41 percent, 17 percent, 5 percent and 11 percent households respectively.

Like block Panchari, 100 percent households in block Chenani used air dry branches as a fuelwood while air dry stems are used in 69 percent households. Similarly air dry roots, wet branches, wet stems and wet roots are used in 51 percent, 36 percent, 21percent and 11 percent households respectively.

**Table-2**  
**Quality of fuelwood used by the households**

S.No	Block Panchari	Air dry branches	Air dry stems	Air dry roots	Wet branches	Wet stems	Wet roots
1	Basnote	30 (100)	28 (93)	15 (50)	11 (37)	3 (10)	0 (0)
2	Chulna	30 (100)	9 (30)	4 (13)	3 (10)	0 (0)	8 (27)
3	Damnate	30 (100)	15 (50)	12 (40)	3 (10)	1 (3)	5 (17)
4	Meer	30 (100)	16 (53)	10 (33)	5 (17)	2 (7)	3 (10)
5	Moungri	30 (100)	27 (90)	21 (70)	4 (13)	2 (7)	0 (0)
Block Chenani							
6	Karian	30 (100)	19 (63)	9 (30)	12 (40)	3 (10)	5 (17)
7	Satayalta	30 (100)	23 (77)	15 (50)	12 (40)	6 (20)	2 (7)
8	Sewna	30 (100)	25 (83)	11 (37)	14 (47)	10 (33)	6 (20)
9	Sudhmahadev	30 (100)	16 (53)	22 (73)	6 (20)	7 (23)	0 (0)
10	Tandar	30 (100)	21 (70)	19 (63)	10 (33)	5 (17)	4 (13)
Total		300 (100)	199 (66)	138 (46)	80 (27)	39 (13)	33 (11)

Source: Survey Data. The figures shown within brackets are in percentage and all percentages are shown in round figures.



**Figure-1**  
**Number of households and quality of fuelwood used in block Chenani**

The following figure shows the number of households of selected villages of block Panchari and various qualities of fuelwood they used as fuelwood for domestic purpose.

**Distance:** Distance covered by the respondent households to search, collect and carry fuelwood is also useful in estimating the extent of fuelwood scarcity in the study area. As we know that when there is scarcity of fuelwood in any area the households walk many miles away from their homes to collect fuelwood. Average distance of all the given Villages of Panchari and Chenani Blocks to collect fire-wood at one time walk (in kms) is presented in the following table 3.

The information gathered from the study area clearly shows that average distance cover to collect fuelwood at one time/one trip walk is between 2 and 3 kilometres that is enough to see the

level of fuelwood scarcity in the study area. Out of all 10 villages the households of Village Meer of block Panchari cover large distance of 2.88 kilometres to collect fuelwood in single walk and households of Village Damnate cover shortest distance of 2 kilometres to collect fuelwood in a single walk. In block Chenani, households of Village Sudhmahadev cover large distance of 2.87 kilometres to collect fuelwood in one time walk and households of Village Tandar cover shorter distance of 2.51 kilometres to collect and carry fuelwood in single walk.

However, the average distance cover to search, carry and collect fuelwood in a single walk of all the given Villages of Block Panchari is 2.60 kilometres and of block Chenani is 2.71 kilometres. The combined average distance cover to collect fuelwood in a single walk in all ten villages of Panchari and Chenani Blocks is 2.66 kilometres. The following diagram

shows the average distance cover to collect fuelwood in all selected villages of Panchari and Chenani blocks at one time/one trip/one walk.

The Average distance cover to collect fuelwood is 2.6 kilometres in block Panchari while the average distance cover to collect fuelwood is 2.71 kilometres in block Chenani. The average distance cover to collect fuelwood in the whole study area (Panchari and Chenani blocks) is 2.66 kilometres.

The following diagram shows the average distance of Panchari and Chenani blocks and combined average distance of both

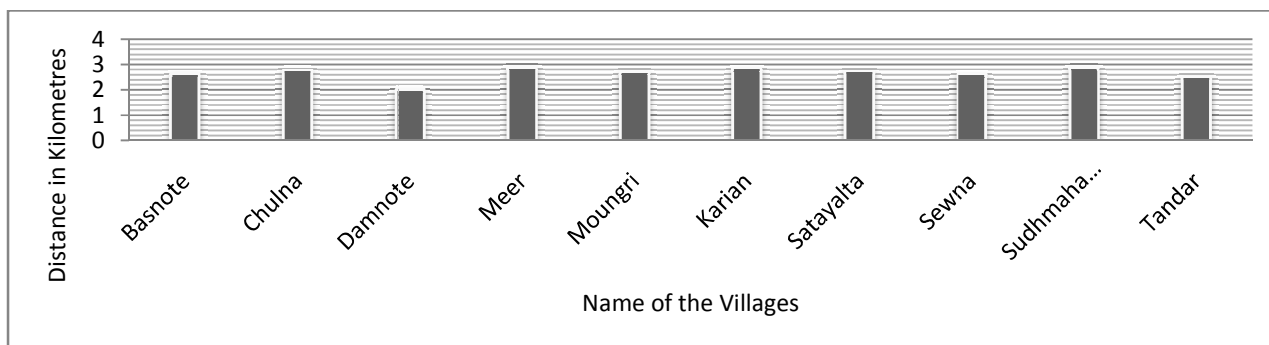
blocks cover to collect and carry fuelwood in one trip/single walk in kilometres.

**Level of Fuel switching:** Due to scarcity of fuelwood some households switch to other fuels like LPGs, Kerosene, electricity, crop residue and dung etc. The table 1.4 shows clearly the number of households switches to LPG along with the reasons of switching. In the study area some households switched to LPG but it does not mean they are not using fuelwood. These households partially (Not completely) switched to LPG.

**Table-3**  
 Average distance of all selected villages of Panchari and Chenani blocks to gather up and carry fuelwood

S. No	Block Panchari	Average Distance Cover to
		Collect Fuelwood at one time (in kms)
1	Basnote	2.633
2	Chulna	2.783
3	Damnote	2
4	Meer	2.883
5	Moungri	2.716
	Block Chenani	
6	Karian	2.833
7	Satayalta	2.733
8	Sewna	2.616
9	Sudhmahadev	2.87
10	Tandar	2.512

Source: Survey Data



**Figure-2**  
 Number of households and quality of fuelwood used in block Chenani

**Table-4**  
 Block wise and combined average distance cover to collect fuelwood in a single walk.

S.No	Name of the Block	Average Distance Cover to
		Collect Fuelwood at one time (in kms)
1	Panchari	2.6
2	Chenani	2.71
Combine Panchari and Chenani Blocks		2.66

Source: Survey Data

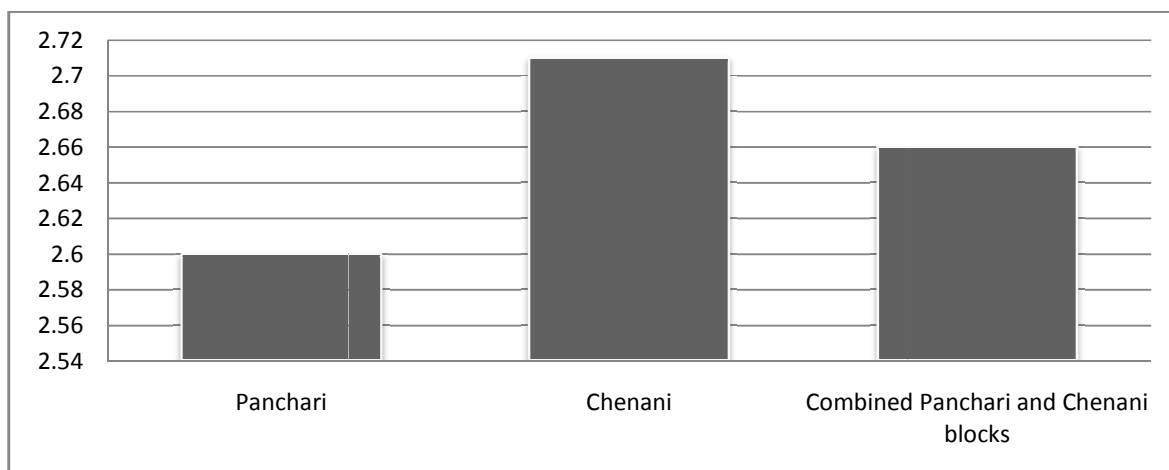


Figure-3

Aaverage distance of Panchari and Cehnani blocks and combined average distance of both blocks (in Kilometres)

Table-4  
 Households switch to LPG and reasons for fuel switching

S.No	Block Panchari	Number of households partially switch to LPG	Year of switching to LPG			Reasons For Fuel switching			
			2002-2006	2006-2010	2010-2014	Scarcity of Fuelwood	Easy to Use	Clean Resource	Lack of Surplus Labour to Collect Fuelwood
1	Basnote	4	0		4	4	0	0	0
2	Chulna	10	4	3	3	10	0	0	0
3	Damnote	5	2		3	5	0	0	0
4	Meer	5	1	4		5	0	0	0
5	Moungri	11	0	3	8	11	0	0	0
	Block Chenani								
6	Karian	8	2	5	1	8	0	0	0
7	Satayalta	0	0	0	0	0	0	0	0
8	Sewna	2		1	1	2	0	0	0
9	Sudhmahadev	13	3	8	2	11	2	0	0
10	Tandar	5	0	3	2	4	0		1
<b>Total</b>		63	12	27	24	60	2	0	1

Source: Survey Data

The data in table-4 shows that Village Moungri of Block Panchari ranked 1<sup>st</sup> with 11 households switched to LPG and Village Basnote ranked lowest with only 4 households switched to LPG. However, In Block Chenani, Village Sudhmadev ranked 1<sup>st</sup> with 13 households switched to LPG and Village Satayalta ranked lowest where not even a single household switched to LPG.

Out of total 300 households of both Panchari and Chenani Blocks, a total of 63(21%) households partially switched to LPG between the year 2002 and Feb 2014.

It is interesting that 12 households switched to LPG between the year 2002 and 2006, 27 households switched to LPG between the year 2006 and 2010 and 24 households switched to LPG between the year 2010 and Feb 2014. The level of fuel

switching towards LPG was highest between the year 2006 and 2010 as compared to the year between 2010 and Feb 2014 may be due to increasing cost of LPG.

Out of 63 households who switched to LPG, 60 households responded that due to scarcity of fuelwood, they switched to LPG. However 2 households responded that main reason for their shift to LPG was 'easy to use' and only 1 household responded that lack of surplus labour to collect fuelwood was the main reason of switching to LPG.

**Monthly consumption of fuelwood and other alternative fuels:** The monthly consumption of fuelwood, LPG, Kerosene, Electricity, Crop Residue and Dung by the households of the study area is shown below in table-5.

**Table-5**  
**Monthly consumption of fuelwood and other alternative fuels**

S.No	Block Panchari	Monthly quantity of different fuels used by the households					
		Fuelwood (in kg)	LPG (No. Of cylinder)	Kerosene (in litre)	Electricity (in usage hours)	Crop Residue (in kg)	Dung (in kg)
1	Basnote	6044	1.06	80	273	65	0
2	Chulna	5693	5.33	90	308	70	25
3	Damnote	11102	1.67	24	291	20	20
4	Meer	8492	2.33	85	0	20	0
5	Moungri	6696	6.24	70	150	0	0
	Block Chenani						
6	Karian	8530	5.72	90	172	86	55
7	Satayalta	9140	0.5	115	133	94	65
8	Sewna	9212	1	132	145	167	72
9	Sudhmahadev	6027	9	74	302	45	60
10	Tandar	11564	1.7	100	240	107	75
Total		82500	34.55	860	2014	674	372

Source: Survey Data

**Fuelwood Consumption:** The data in table-5 shows that in Village Damnote of Block Panchari monthly consumption of fuelwood is highest with 11102 kg and Village Basnote has lowest fuelwood consumption of 6044 kg. On other hand, in Block Chenani Village Tandar has highest monthly fuelwood consumption of 11564 kg whereas Village Sudhmadev has lowest monthly fuelwood consumption of 6027 kg. The monthly consumption of fuelwood is highest in Block Chenani with 44473 kg as compared to Block Panchari which has monthly consumption of 38027 kg fuelwood. The combined monthly consumption of all the selected villages of both Chenani and Panchari Blocks is 82500 kg.

**LPG Consumption:** Monthly consumption of LPG is highest in Block Chenani with 17.92 LPG cylinders whereas in Block Panchari it is 16.63 LPG Cylinders.

In aggregate a total of 34.55 Cylinders per month used by the households in study area. Sudhmadev with a consumption of 9 Cylinders per month is on top position whereas Village Sewna with consumption of only 1 Cylinder per month is at bottom position.

**Kerosene:** In the study area households use kerosene mostly for lightning purpose and in some cases for making tea or boiling milk. In very few cases households use kerosene for cooking purpose. The data collected from study area shows that a total of 860 litres kerosene used by the households for various purposes like lightning, tea making and even in some cases for cooking food. Monthly consumption of kerosene is highest with 132 litres in Village Sewna of Block Chenani. However the monthly consumption of kerosene is lowest with only 24 litres in Village Damnote of Block Panchari.

In the selected Villages of Block Chenani monthly kerosene consumption is highest with 511 litres as compared to the

selected Villages of Block Panchari where monthly consumption of kerosene is 349 litres.

**Electricity Consumption:** Use of electricity for various purposes like lightning, heating and cooking etc. Is one of the best alternative to the scarcity of fuelwood. The data collected from the selected Villages of Chenani and Panchari Blocks shows the monthly consumption of electricity in hours for cooking purpose. In aggregate 2014 hours per month electricity is used for cooking purpose. In Block Panchari households used more electricity with 1022 hours per month as compared to Block Chenani where only 992 hours electricity used for cooking purpose. The Village Chulna of Block Panchari use more electricity for cooking purpose with 308 hours per month and in Village Meer of the same Block not even a single household use electricity for cooking purpose.

**Crop Residue:** The monthly consumption of crop residue by all the households of the study area is 674 kg out of which 175 kg monthly crop residue is used by the households of Block Panchari and 499 kg of crop residue is used by the households of Block Chenani. Monthly consumption of crop residue for cooking purpose is highest in Village Sewna of Block Chenani with 167 kg monthly consumption. On other hand there is not even a single household in Village Moungri of Block Panchari where crop residue has been used for cooking purpose.

**Dung:** In the study area dung has been used by only 6 Villages out of 10 selected Villages. In aggregate monthly dung consumption is 372 kg for cooking purpose. In Block Chenani, monthly 327 kg dung used for cooking purpose however in Block Panchari only 45 kg dung used monthly for cooking purpose. There is not even a single household in 3 Villages of Block Panchari named Basnote, Meer and Moungri where dung is used for cooking purpose.

## Conclusion

i. A sum of 266 families (out of 300 households) in all the selected villages of Panchari and Chenani blocks depend on more than one source of fuel for domestic use. ii. 46 percent households depend on 'Forest on Village common land', 36 percent depends on 'Reserve Forests' and only 18 percent households depend on 'Own Farmland' for fuelwood. iii. The low percentage of households depend on Own Farmland and high percentage of households depend on Forest on Village common land and Reserve Forest for fuelwood indicates that fuelwood in nearby areas/own farmland has been declined and they are highly intervene in Forest on common land and Reserve Forests. iv. The monthly consumption of fuelwood is highest in Block Chenani with 44473 kg as compared to Block Panchari which has monthly consumption of 38027 kg fuelwood. The combined monthly consumption of all the selected villages of both Chenani and Panchari Blocks is 82500 kg which is enough to understand that fuelwood is still a major source for domestic cooking purpose in the study area. v. About 66.33 percent households use air dry stems while air dry roots are used in 46 percent households. Similarly 26.7 percent households use wet branches, 13 percent households use wet stems and 11 percent households used wet roots for cooking purpose. vi. The average distance cover to search, carry and collect fuelwood in a single walk of all the given Villages of Block Panchari is 2.60 kilometres and of block Chenani is 2.71 kilometres. The combined average distance cover to collect fuelwood in a single walk in all ten villages of Panchari and Chenani Blocks is 2.66 kilometres. This fuelwood collection distance between 2 and 3 kilometers in a single walk is enough to see the level of fuelwood scarcity in the study area. vii. Out of total 300 households, a total of 63(21%) households partially switched to LPG between the year 2002 and Feb 2014. It is interesting that 12 households switched to LPG between the year 2002 and 2006, 27 households switched to LPG between the year 2006 and 2010 and 24 households switched to LPG between the year 2010 and Feb 2014. The level of fuel switching towards LPG was highest between the year 2006 and 2010 as compared to the year between 2010 and Feb 2014 may be due to increasing cost of LPG. viii. A total of 34.55 Cylinders per month used by the households in study area. Whereas monthly consumption of

LPG is highest in Block Chenani with 17.92 LPG cylinders whereas in Block Panchari it is 16.63 LPG Cylinders. ix. In the selected Villages of Block Chenani monthly kerosene consumption is highest with 511 litres as compared to the selected Villages of Block Panchari where monthly consumption of kerosene is 349 litres. x. About 2014 hours per month electricity is used for cooking purpose. In Block Panchari households used more electricity with 1022 hours per month as compared to Block Chenani where only 992 hours electricity used for cooking purpose. xi. The monthly consumption of crop residue by all the households of the study area is 674 kg out of which 175 kg monthly crop residue is used by the households of Block Panchari and 499 kg of crop residue is used by the households of Block Chenani. xii. Dung has been used by only 6 Villages out of 10 selected Villages. In aggregate monthly dung consumption is 372 kg for cooking purpose. In Block Chenani, monthly 327 kg dung used for cooking purpose however in Block Panchari only 45 kg dung used monthly for cooking purpose. xiii. The average distance to collect fuelwood is between 2 and 3 kilometers in a single walk shows there is some scarcity of fuelwood in the study area. However people still prefer fuelwood, as it is clear from the monthly consumption of various fuels that fuelwood is still a major source for cooking.

## References

1. Saxena N.C., The wood fuel scenario And policy issues in India, Field document No. 49, 1-10 (1997)
2. Heltberg R., Channing, T.C. and Sekhar, N.U., Fuelwood consumption and forest degradation: a household model for domestic energy substitution in rural India, *Land Economics*, **76(2)**, 213-232 (2000)
3. ORGI, Census of India on basic Amenities, (2011)
4. Martin A. and Lemon., Gender and forestry : integrating local knowledge into environmental planning and management, *International journal of sustainable development (IJSd)*, **4(3)**, 265-285 (2001)
5. Ramus H., Fuelswitching: evidence from eight developing countries, *Energy Economics*, **26**, 869-88 (2004)