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Full Length Research Article

MAPPING FUEL MIX IN RURAL AREAS: A CASE STUDY OF INTERFUEL SUBSTITUTION IN DODA DISTRICT (J&K)

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ABSTRACT

Fuel is a substance which when burns provide heat or power or the substance act as a store of energy for which it may be made to react in a way with the releases of energy in the form of heat, a substance that release energy to be used for work, while making it to react with other substance. This energy released from the fuel is the most important component of all human activities, providing services like heating, cooking, lighting, generating industrial output, mineral extraction and transportation. It is the most powerful engine of socio economic development and lies at the base of industrial economy. Without ensuring a minimum access to energy no county can be able to develop beyond a subsistence level. Not just one type of fuel is used but different types of fuels are used. In fact people also show a habit to use different types of fuels at the same time which means they show a tendency to use fuel mix at a particular point of time and they also show a feature where they substitute the traditional energy source by modern fuel with the improvement in the income level. So the study aims to examine the status of fuel mix used in the study area and to identify the demand side and supply side determinants of fuel demand. For this 120 households have been selected from four villages of two blocks (two from each). And we have found that maximum people in the area are dependent firewood and others are using fuel mix comprising of two or more fuels. Those who are firewood users wish to switch from firewood to other modern fuel but have no ample resources to fulfill their wish of using modern fuel and the remaining who do not wish to switch is only due to the fact they are suffering from extreme poverty due to which they first want to meet their basic wants like food, clothing, education of their children. Therefore there is a need that the government, first it has to fulfill the basic requirements of the people and to provide them facilities of modern fuel like LPG either at lower price or to freely distribute the same.

INTRODUCTION

Fuel lies at the base of every economy. Not only at micro level, where it is useful for an individual in cooking, heating, getting warmth in winters, lightening of houses travelling etc but also on macro level fuel / energy sources are very important, in fact it lies at the base of every development. It is very important for every sector of economy whether we talk about agricultural sector, industrial and service sector.

Fuel switching and Energy ladder

Although different fuels are available but it is not true that all the fuels are used at the same time.

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Researcher have discovered that a pattern is followed by the people, with the development, increase in income, more commercialization, he shifts from traditional to new and cleaner fuel or source of energy .In the other words, with the development people have a tendency of switching to modern and clean fuel. This habit of people is known as fuel switching. Even within these developing countries there is a demarcation between households having high economic status and household with low economic status, the former use modern and clean fuel while the latter use traditional fuel. With the improvement in the condition of the low strata population, they tend to switch to modern fuel. The hypothesis that explains the phenomenon is known as Energy Ladder. Figure 1.1 shows the energy ladder. In developing countries around 90% of people have lack of access to sufficient energy resources and around 2.4 billion depend on biomass, Barnes

and Floor (1995). Biomass and firewood is the most is the most important sources of energy for household in developing countries.10.4% of the total primary energy, 77.4% of global renewable energy (IEA 2003). Biomass contributes 38% of the total energy in developing countries an14% of the global energy (Wood and Hall). Firewood repeated the same phenomenon after ten years with its contribution 62.5 percent in rural energy share, followed by crop residue 12.3 percent, LPG with 11.4 percent, cow dung10.9 percent, kerosene 0.7 percent, electricity 0.1 percent, any other 0.6 percent and 0.2 percent with no cooking arrangement (census 2011). In order to know the fuel mix used in the study area four villages have been selected from where it has been observed that firewood is used by maximum (60.0 percent) of households and (40.0 percent) use fuel mix Jammu and Kashmir. Fuel mix mainly used mainly consists of two fuel mix.

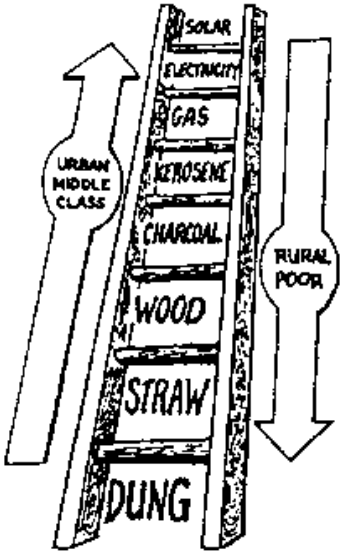


Figure 1. Energy ladder

MATERIALS AND METHODS

Study is related to Doda is situated between 32° 53′ and 34°21′ N latitude and 75°1′ and 76° 47′ E longitude E and is an eastern district of Jammu region. Doda consists of eight blocks and 406 villages of which the four villages namely Birshalla and Malna of Ghat block and Thanala and Strangle from Bhaderwah block. The research is based on data collected from sample of 120 households 30 from each village. The main reason behind the selection of villages is to get clear understanding of fuel mix in the rural households and whether they are substituting the firewood with the modern fuel. For the collection of data, a detailed questionnaire was prepared which involve the various aspects such as socio-economic status, income profile, occupational status, energy mix used in the area, quantity and types of fuel consumed along with other information. After the collection data the data was tabulated and various simple statistical tools were used like percentages, sum total etc.

RESULTS AND DISCUSSION

Fuel mix used in the area is influenced by the socio economic profile, occupational profile, income level, educational level etc which are also the demand side and supply side factors influencing the same.

Socio-economic and demographic profile

Demography is the study of human population that involve the study of the structure, size and distribution of population and the special or temporal changes that occur in them in response to birth, aging, migration and death. The present study is related to the study area where 67 percent of population belongs to age group 15-65, 4.0 percent above 65, 29 percent between 0-15 age.16 percent of the males and 13 percent of females are below 15 years and 6 percent male and 5 percent of females are below five years. Total males and females having age between fifteen 15 to 65 is 37 percent and 30 percent respectively. More than 1/3rd of population which is around 45 percent of population has age more than twenty five and less than sixty five years, share of male and female is 24 percent and 22 percent respectively. From the survey it is also realized that majority of the population belongs to demographic dividend which is very good sign of progress as they are considered as a valuable asset as being productive and contributing to growth and development.

Family profile of the Respondent Households: Family profile is also known as parental profile. It provides the description of family members whether the family is nuclear or joint. Nuclear families are the families with total members four or less. Joint families are the families where number of families is more than 4 members.

Table 1. Family profile of the respondents

			Family type		
		Blocks	Doda		
S. NO	Block	Village	Nuclear	Joint	Total
1	Ghat	1 Birshalla	11	19	30
			(36.7)a	(63.3)a	(100)a
			(28.9)b	(23.2)b	(25)b
		Malna	11	19	30
			(36.7)a	(63.3)a	(100)a
			(28.9)b	(23.2)b	(25)b
2	Bhaderwah	Thanala	9	21	30
			(30)a	(70)a	(100)a
			(23.8)b	(25.6)b	(25)b
		Sertangle	7	23	30
			(23.3)a	(76.7)a	(100)a
			(18.4)b	(28.0)b	(25)b
3		Total	38	82	120
			(31.7)a	(68.3)a	(100)a
			(100)b	(100)b	(100)b

Source: Sample survey

Subscript a-shows the percentage of family type with respect to row total.
b -shows the percentage of family type with respect to column total.

It can be seen from the table1.0, 31.7 percent of the respondent households have nuclear family and 68.3 percent of respondent households have joint family. In Birshalla, Malna, Thanala and Sertangle 37 percent, 37 percent, 30 percent and 23 percent of the respondent households have nuclear family.

Socio-economic status of the Respondent Household

Socio economic status shows an individuals or group position within a hierarchical social structure. It depends on large number of factors like occupation, income, education, wealth, place of respondents. It is measured as a combination of occupation, education and income.

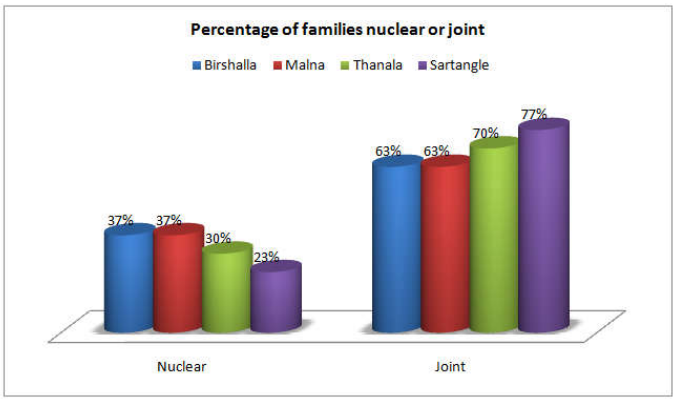


Figure 1. Shows percentage of households having joint or nuclear family

Income status: Income is the payment or return received by the factors of production in the form of wages, profit, rent, salaries and any flow of earning received. In the other words income is the sum of all the wages, profits, salaries, interest payments, rents, and other forms of earnings received in a given period of time. From the table it can be seen that 66.7 percent of the respondent households have family income up to 10000, 28.3 percent of the respondent households have income between 10000-20000, 4.2 percent have income between 20000-50000, 0.8 percent have income above 1 lakh. It means that maximum of the households have income up to 10000 and less than 1 percent have income above 1 lakh. It means that more than half of the total sample households have monthly income less than ten thousand and less than 1 percent of the total sample households have above 1 lakh income.

Table 1. Economic status of the Respondent Households

S. no	Block	Village	Economic status			Dependency ratio
	Block		Earning	Dependent	Total	
1	Doda	Birshalla	37	135	172	65.4
			(21.5)a	(78.5)a	(100)a	
		Malna	(24.0)b	(26.3)	(25.7)	
			38	124	162	33.6
			(23.5)a	(76.5)a	(100)a	
			(25.0)b	(24.1)	(24.2)	
2	Bhaderwah	Thanala	40	130	170	50.4
	Thanala		(23.5)	(76.5)a	(100)	
			(26.0)b	(25.3)	(25.4)	
		Sertangle	(26.0)b	(25.3)	(25.4)	
	Sertangle		40	125	165	58.6
			(24.5)a	(75.5)a	(100)a	
		Total	(26.0)b	(24.3)b	(24.7)	
3	Total		155	514	669	51.4
			(23.2)a	(76.8)a	(100)a	
			(100)b	(100)b	(100)b	

b- shows the percentage with respect to column total

Table 2. Income profile of the Respondent Households

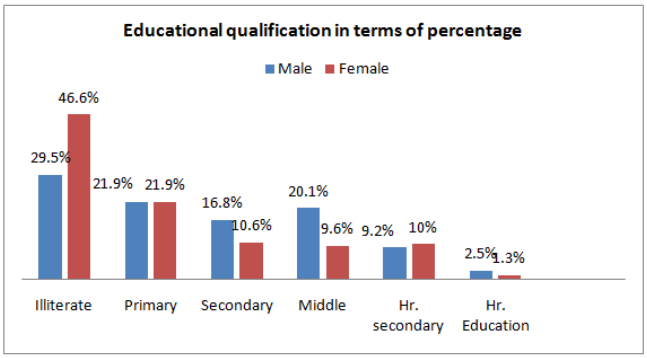
S no	Block		Up to 10000	10000-20000	20000-50000	50000-1 lakh	Above 1lakh	Total
1	Doda	Birshalla	19	9	2	-	-	30
			(63.3)a	(30)a	(6.7)a			(100)a
			(23.8)b	(26.5b)	(40)b			(25)b
		Malna	19	8	3	-	-	30
			(63.3)a	(26.7)a	(10)a			(100)a
			(1.3)b	(23.5)b	(60)b			(25)b
2	Bhaderwah	Thanala	20	10	-	-	-	30
			(66.7)a	(33.3)a				(100)a
			(25)b	(29.4)b				(25)b
		Sertangle	22	7	-	-	1	30
			(73.3)a	(23.3)a			(3.3)a	(100)a
			(27.5)b	(20.6)b			(100)b	(25)b
3	Total		80	34	5	-	1	120
			(66.7)a	(28.3)a	(4.2)a	-	(0.8)a	(100)a
			(100)b	(100)b	(100)b		(100)b	(100)b

Source: Sample
Subscript a-shows the percentage of family type with respect to row total
b- shows the percentage of family type with respect to column total

It can be seen that from table 1.1 that 77 percent of population of the study area are dependent on remaining 23 percent of earning population. Number of dependent in Birshalla 78.5 percent is slightly higher than Malna with 76.5 percent dependent and Thanala with 76.5 percent and in Sertangle it is 75.5 percent. The Dependency ratio has been shown in the last column of the table which is calculated by the following formula . D R= (number of people aged 0-14 and those above 60)/ number of persons aged 15-59) multiplied by 100.

Level of fuel switching in the study area

Fuel Mix is the common phenomenon found worldwide which is practiced by households, it is mainly concerned with the practice in which household at the same time use several sources of energy sources for cooking at the same time. It has been realized that households in rural areas do not switch completely from traditional to modern fuel but they adopt a fuel mix strategy in which new cooking technologies and new fuels are added but traditional system are not stopped clearly.



Source: Data plotted from the field survey

Figure 4. Educational Qualification of Male and Female to total Male and Female

Share of different fuels in fuel Mix use in the Study Area

In order to know the fuel mix used in the area and whether the rural households are showing a tendency to switch from traditional to modern fuel for domestic purpose, the data has been collected from 120 households of four villages (30 from each).Information has been collected from the respondents about the type of fuel used by the households of the area. In order to have comparative view about the fuel mix used in the two blocks information has been collected from the respondents of four villages (two from each) to know whether difference exist in the type of fuel mix used. From the table1.4 it has been realized that in the four villages, out of 120 households 55 percent are not using fuel mix but they are using single type of fuel i.e. firewood, other 45 percent are using multiple fuel at the same time. Out of 45 percent, 29 percent are using two type fuel mix, 14 percent are using three fuels at the same time and 2 percent are using four type fuel mix.

Educational profile

From the survey it has been observed that of 669 respondent households 248 were illiterate, 146 have studied primary, 94 have studied secondary, 103 respondent households have studied middle, 64 have studied hr. secondary and 12 have studied higher education which include graduation and post graduation. In the four villages out of 368 males, 108 males are illiterate and out of 301 females 140 are illiterate which means 29.5 percent of the male respondent households illiterate and 46.6 percent of the respondent female households are illiterate.80 male respondents have studied primary and 66 female respondent have studied primary. 62 males and 32 females respondent have studied secondary, 74 male and 29 female respondent have studied middle, 34 male and 30 female have studied higher secondary and 8 male and 4 female respondent households have studied higher education including graduation and post graduation.

From the table 1.6 it can be seen that maximum of the households in the four regions are willing to switch from the present source of energy for domestic purposes to LPG which are about 81.7 percent of the total sample households while 18.3 percent do not want to switch from the present source. Out of 120 households 22 do not want to switch from the present source of energy used by them because either they have switched completely to LPG or they are so poor that they first want to fulfill their basic needs.

Reason behind switching

Out of the total sample households 69.2 percent of the sample household want to switch from the 69.2 percent are willing to switch from the current fuel to modern fuel as being cheaper and save time, 11.7 percent are willing to switch as being cheaper, 11.6 percent are willing to switch because of being subsidized and saves time, 5 percent are willing to switch as being subsidized and 2.5 percent want to switch if provided cheaper. In all the four villages maximum want to switch because it will save time and if provided cheaper.

Willingness of the respondents to switch from the present fuel to other and level of awareness

Willingness to swith

Table 3. Willingness to switch to other source

S no	Block	Village	Kerosene	LPG	Solar Equipment	No	Total
1	Doda	Birshalla	-	22 (73.3)a (22.4)b	-	8 (26.7)a (36.4)b	30 (100)a (25.0)
		Malna	-	25 (83.3)a (25.6)b	-	5 (16.7)a (22.7)b	30 (100)a (25.0)b
2	Bhaderwah	Thanala	-	26 (86.7)a (26.5)b	-	4 (13.3)a (18.2)b	30 (100)a (25.0)b
		Sertangle	-	25 (83.3)a ((25.5)b	-	5 (16.7)a (22.7)b	30 (100)a (25.0)b
3	Total		-	98 (81.7)a (100)b	-	22 (18.3)a (100)b	120 (100)a (100)b

Source: Sample survey
Subscript a-shows the percentage of family type with respect to row total
b-shows the percentage of family type with respect to column total

Level of awareness among the households

From the data collected of the total the sample households108 households (90 percent) are aware about renewable resources and 12 (10 percent) are not aware of it. Among the total

households only 9 households (7.5 percent) use solar lights in while others 111 household (92.5 percent).Among the non users 26 percent believe that subsidized solar lights will not make them to switch to them mainly because people in the rural areas are suffering from poverty and want first to fulfill their own basic needs.

Conclusion

From the study we can conclude that most of the people in the study area are still dependent on firewood for cooking 55 percent of the total sample households and other 45 percent of sample households use fuel mix out of which 29.2 use fuel mix of two fuel mix, 14.2 percent use three fuel mix and 1.6 percent use four fuel mix. The firewood users are willing to switch to modern fuel like LPG if it is distributed to them at low cost. Those who are not willing to switch to modern fuel even at low cost is because of the fact that they are so poor that they cannot fulfill their basic needs. Government has to come forward for providing them the facilities of modern fuel that they may switch to the efficient source of energy and should first improve their economic condition because of the fact that as income increases people usually switch to modern fuel

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