

Primary Energy Consumption among the Forestry and rural of Pachiparai village in Kanyakumari district: An Economic Analysis

Energy consumption has been greatly emphasized for various purposes of households due to the empowerment of consumers in social and economic status. Economic classifications of people and regional disparities have separated the cooking energy as commercial and non-commercial type. Mainly, income is a major significant factor that is found in the rural and forestry regions of Pachiparai village. There about total of 90 respondents have been chosen and classified as 45 respondents from each boundaries (forestry and rural). Collected data have been analyzed by appropriate statistical tools such as Pearson Chi-square and ANOVA to find out the power of income in cooking energy consumption on economic value. In the result and discussion, causes for data fluctuations have been pointed out and effective recommendations have been provided favour of economically weaker section.

Key words: Economic classification, Spends, Power, Purpose, Demand, Income

Introduction

India a developing country is empowering all the sectors with the gyrate of various governmental schemes and policies. Especially, the government focuses the rural areas in ensuring effective tactics for the purpose. Though, due to availability and affordability many economically backward regions still depends on traditional energy for cooking purpose. Pre-planning of present government efforts on this, people uses primary cooking energy all over the world but, initiation of technical empowerment and interference of government have promoted the rural and urban areas to be enriched in their lifestyle and consumption pattern. But, people from forestry and surroundings, still living in trouble in boosting up cooking energy consumption. Firewood, kerosene and agricultural wastes are the major cooking energy of southern part of India. Hence, knowledge of the energy for cooking in household will help us to identify the trend consumption and its economic values. The history of firewood used as cooking fuel reveals that, the wood energy is common and it had Genesis that usually applied for heating purpose only due to lack of technology in making spark and pots for cooking purpose. The Greeks, Romans, Celts, Britons and Gauls have pointed the significance of using firewood for cooking purpose. Thereby, demand for firewood has become enormous throughout the world in various purposes and the use of firewood demanded chimney on the roof of tent and it became permanent cooking fuel for the households. Timbers from forest were burned to collect the charcoal for easy mobility and distribution to the consumers due to its patulous size. In 1846, Prince Edward Island has booted the efforts in making future as brighten by illuminating around the world. As a result of this, North American came to use fuel for lamp, initially kerosene was too expensive compared to fuels applied before kerosene but, later they found that kerosene can be taken from petroleum by refining process. 1850 and afterwards, kerosene has

Among the pachiparai village respondents, high and middle income groups are showing high priority to consume primary energy according to their economic standard and low income group of respondents prioritized primary energy for free of cost.

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became most popular fuel for household purpose and it spread all over the nations (bev cline, 2007). But, its consumption power began to contest with electricity and declines though, still many developing countries have consumed kerosene as their main household energy for lighting and heating purpose like India. Agricultural wastes are also a kind of energy used for household purpose and it was derived from agricultural activities.

Objective

Primary cooking energy consumption among the rural and forestry is taken for this study and accordingly objectives were framed. Further from the results drawn, effective recommendations were provided to the welfare of the people.

- To know the primary energy consumption in economic value among the selected area.
- To perceive the power of income in cooking energy consumption among the selected area.

Methodology

Area profile

Pechiparai is a Village which comes under Thiruvattar block which is included in Kalkulam Taluk of Kanniyakumari District in Tamil Nadu State of India. It is located 39 Km. away from district head quarter, Nagercoil at the north part of the same. This Place is at the border of Kanniyakumari district and Thiruvananthapuram district of Kerala state. Nearer the village massive Dam 'Pechiparai' is surrounded and it supports people in all needs like drinking and irrigation. The water from the reservoir has been used to the large area of moor land in Kanyakumari district which has been converted into agricultural land. So, people from here mainly involves in agricultural and cooli activities to maintain their economic power. This area adapted by dense bioclimatology of evergreen forests that accounts many valuable trees, and many different types of wild creatures such as tiger, deer, elephants, wild buffaloes, porcupines, wild cats, and so on. Here very few number of hill tribes living in the name of 'Kanikars' and reside in the deep forests. The surrounding villages and its distance from Pechiparai is 7-19 km the native language of Pechiparai is Tamil and most of the village people speaks both Tamil and Malayalam.

Data sources

This study has taken firewood and kerosene as the primary cooking energy which is usually prevailing among them and classified the area as forestry and rural with total of 90 respondents that separated as 45 respondents from each boundary and were classified based on income category randomly consisting of 15 respondents for each income group. To classify the economic status of people, the research found that income of the respondents is the only way to identify

the energy consumption pattern. So, the income was classified as low income of forestry people, below 8 thousand, middle income ₹ 8000-16000 thousand and high income of above ₹16 thousands because temporary income arises from cooli and agricultural activities. Rural income was taken as below ₹10 thousand as low, middle income ₹10000-20000 and above ₹ 20 thousand as high income due to existence of both temporary and permanent income received from business and other jobs. So, the economic value for primary energy was fixed from below ₹ 500 to above ₹ 1500 as their monthly consumption. Collected primary data has been calculated by Pearson's Chi-square test with the hypothesis framed to bring result on whether income is a base for primary cooking energy consumption or not? if the income apt with their consumption, efforts of government in supply of alternative cooking energy must be favour to the Pechiparai village.

As early, consumption prevailed by swop and later it became stronger by innovation of coins and cash. Today, there is no consumption with absence of cash transaction. But, demand for various commodities are not minimized by invention and innovation of technology due to effective improvements in percapita income and life style of people. Consumption may vary person to person based on existing economic power but no great changes accumulates in demand for utilizing such goods and services as everyone is looking forward. Thereby, demand and consumption pattern among the rural and forestry people depend on the potentiality of economic power they possess. As we know that, the relationship between income and demand evaluates by both normal and inferior goods which identifies the direct and inverse relationship (www.economicsonline.co.uk/Competiti...). There is no limit in the consumption of normal goods having direct relationship that when income increases demand also moves in the same trend. But, there is limit in the consumption of inferior goods having inverse relationship that when income increases demand for the goods will be horizon (Tchereni, 2013). Thus, primary cooking energy among the households determined that it is inferior goods if other factors are silence in improvement.

Agriculture is the main occupation of the people from forestry and rural and it is permanent income source of the people supporting to economic development (Adepoju *et al.*, 2012). So, this is not only the income source but also the way of life of them (insightsonindia.com/wp-content/uplo...). Price of timber and firewood is increasing on and on from 1985 (Saxena, 1997) thereby, as for domestic consumption, people have to pay increasing amount according to their consumption. Thus, rational consumers have produced economic value for their demand which had no value in past century. Therefore, study about the relationship between income and demand may be

common like income and consumption. But there is no more variations between consumption and demand because, consumption is an outcome of demand if other factors are in favour to demand. To execute demand as visual, the factor of income plays vital among the varieties of goods and services so, as choices of people, consumption of cooking energy is also enrolled with the income.

Table 1 shows the data of primary energy consumption by the forestry people based on income classifications in the selected area. Out of 45 respondents, each income group contains 15 respondents and has been classified as low, middle and high income. Among the 15 respondents in low income group, 13 of them consume primary cooking energy at below 500 rupees and two of them spend ₹ 501-1000. From 15 respondents in middle income group, eight of them consume energy at below 500 rupees and seven of them at 501-1000 rupees. Among the 15 respondents in high income group, 8 of them spend 501-1000 rupees for their energy consumption, five respondents at 1001-1500 and remaining two consumes energy above 1500 rupees. Thus, out of 45 respondents, a majority of about 21 respondents (46.7) consuming primary energy fall under the expense level below ₹ 500. This is followed by 17 respondents (37.8) in expense

group of ₹ 501-1000, Five respondents (11.1) in expense group of ₹1001 1500 and 2 respondents (4.4) in above 1500 expense group.

Table 2 shows the energy consumption based on income categories of the rural people of the selected area. Out of 45 respondents, each income groups consists of 15 respondents and income has been classified as low, middle and high income group. Out of 15 low income categorized people, nine of them spends below 500 rupees, six of them spends 501-1000 rupees for their cooking energy. Six respondents spends below 500, eight comes under 501-1000 spending group and one of respondent pays 1001-1500 rupees for primary energy among 15 respondents of middle income group. At the high income category, out of 15 respondents, seven of them spend 501-1000 rupees, five of them spend 1001-1500 rupees and three respondents spend above 1500 in cooking energy consumption. Thus, among 45 respondents in rural area, 21 respondents spend 501-1000 rupees for energy consumption and three respondents have spend above 1500 for their cooking energy purpose.

Table 3 expresses the pachiparai village people's common spending capacity for energy consumption in the situation of trouble to obtain primary energy for

Table 1: Income and energy expenditure of forestry people

Expense in ₹	Forestry			Total
	Low income	Middle income	High income	
Below 500	13 (86.7)	8 (53.3)	0 (0.0)	21 (46.7)
501 - 1000	2 (13.3)	7 (46.7)	8 (53.3)	17 (37.8)
1001 - 1500	0 (0.0)	0 (0.0)	5 (33.3)	5 (11.1)
Above 1500	0 (0.0)	0 (0.0)	2 (13.3)	2 (4.4)
Total	15 (100.0)	15 (100.0)	15 (100.0)	45 (100.0)

Source: Primary data

Note: Figures in brackets are percentage to the total

Table 2: Income and energy expenditure of rural people

Expense in ₹	Rural			Total
	Low income	Middle income	High income	
Below 500	9 (60.0)	6 (40.0)	0 (0.0)	15 (33.3)
501 - 1000	6 (40.0)	8 (53.3)	7 (46.7)	21 (46.7)
1001 - 1500	0 (0.0)	1 (6.7)	5 (33.3)	6 (13.3)
Above 1500	0 (0.0)	0 (0.0)	3 (20.0)	3 (6.7)
Total	15 (100.0)	15 (100.0)	15 (100.0)	45 (100.0)

Source: Primary data

Note: Figures in brackets are percentage to the total

Table 3: Aggregate respondents among energy expense groups

Expense in ₹	Pachiparai villagel		Total
	Rural	Forestry	
Below 500	15 (33.3)	21 (46.6)	36 (40.0)
501 - 1000	21 (46.6)	17 (37.7)	38 (42.2)
1001 - 1500	6 (13.3)	5 (11.1)	11 (12.2)
Above 1500	3 (6.6)	2 (4.4)	5 (5.5)
Total	45 (100.0)	45 (100.0)	90 (100.0)

Source: Derived from Table 1 and 2

whole period of the year. Expense groups are indicated as economically up to more than ₹ 1500 as their spending abilities for energy purchases within and rest of the village. Ninety respondents in the village have been selected based on rural and forestry that statistically focuses maximum thirty eight respondents are belongs to ₹ 501 -1000 expense group and thirty six respondents are shown their ability to spend upto ₹ 500 and minimum sixteen respondents are spending more than ₹ 1000 for their energy consumption.

Moreover, as an advancement of this study, researcher constructed this study and analysed the whole study by micro economic theoretical diagram which gives appropriate design for the study purpose and focusing the data priority on specialisation. For the diagrammatical analysis of the study, expense groups have been considered based on income groups of the respondents due to consumption does not overcome without strong income base. Hence, Below ₹ 500 expense group considered low income group of, ₹ 501-1000 expense group exposed middle income group of and ₹ 1001 - 1500 and above ₹1500 expense groups have assumed high income group of the respondents. Because, most of high income group of the respondents of village, are shown their ability to spend for energy is ₹ 501 - 1000. Hence, according to Table 3 high income group of the respondents also entering the maximum result shown as thirty eight respondents are in ₹ 501- 1000 expense group out of the total of ninety respondents of the village. So, income groups of the respondents have been separated based on expense groups. Thus, this analysis part signifies those who are spending more than ₹ 1001 are belonging to high income group.

Fig. 1 says the respondents highly belonging in which expense group and their likely participation with their

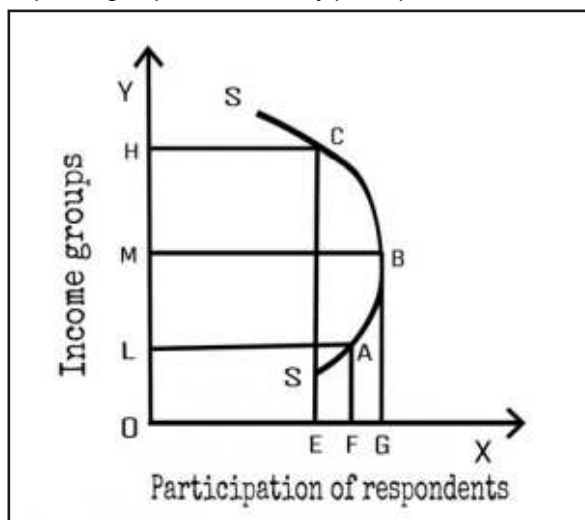


Fig. 1: Participation of respondents in different expense groups
Source: Computed by author

economic empowers. 'OX' horizontal axis focuses the volume of respondents in spending for energy belonging to different income groups and 'OY' vertical line says different income groups. 'SS' is the supply curve and the reason for the position of the same being thus is flexibility in supply of primary energy from the contribution of nature and trade within village people. Now according to Table 3 and expense based income classification (pointed fifth line of paragraph above the Fig. 1), High income group of the respondents in participating expense group for energy consumption is very less that explained by the point 'C' in supply curve which directs to horizontal axis at 'E'. Thus, according to table 3 minimum sixteen high income groups of the respondents are participates in energy consumption at above ₹ 1001 expense group. Moreover, middle income groups of respondents are participating highly around thirty eight out of ninety in the village spending ₹ 501-1000 for energy consumption and volume of them has been proved diagrammatically at the point 'B' which directs down to the point 'G' and low income group of the respondents spending below ₹ 500 for energy also focused at the point 'A' and assessed their participation at 'F'. Thus, highly thirty eight respondents of middle income group at 'OG' level, thirty six respondents of low income group at 'OF' level and very less sixteen respondents from higher income group at 'OE' level of respondents out of ninety of total participates in different expense groups for energy consumption among rural and forestry of pachiparai village.

Data analysis

The data analyzed further by Pearson Chi-square test, one way ANOVA (Analysis of Varians) and the result is computed by comparing the values of both test and table value. Finally, result is given based on the framed hypothesis for each classified area. Hypothesis plays a significant role to consider the collected data whether it has life or not and this is classified as H_0 = null Hypothesis and H_1 = Alternative Hypothesis. H_0 points negative and H_1 express positive statement of framed hypothesis. The hypothesis is framed on follows,

Forestry of Pachiparai village

Pearson Chi-square test

Hypothesis for income and expenditure of forestry people.

- H_0 = Income is unsuitable molecule to identify the primary cooking energy consumption on economic value in forestry of Pechiparai village.
- H_1 = Income is suitable molecule to identify the primary cooking energy consumption on economic value in forestry of Pechiparai village.

Table 4 reveals the result of calculated Pearson Chi-square test at five percent level of significance for

Table 4: Test on Income and energy expenditure of forestry people

Test	Value	df	Asymp.sig (2-sided)	Table value	Result
Pearson Chi-square	29.933	6	.000	12.6	Rejected

forestry data and resulted that the test value is greater than table value ($29.933 > 12.6$). Hence, result upcoming that, reject the null hypothesis and accept the alternative hypothesis. Therefore, this study reveals, that income of the respondents is an adequate base to consider the cooking energy consumption on economic value in forestry of selected area.

ANOVA;

- H_0 = There is no variations in expense of cooking energy among the different income groups of sample respondents in forestry of Pachiparai village.
- H_1 = There is variations in expense of cooking energy among the different income groups of sample respondents in forestry of Pachiparai village.

Table 5 express the result of expense variations among the different income groups of the forestry people of pachiparai village. Hence, this analysis resulted that, there is significantly consumption variations among the income groups of the respondents in expense of energy consumption at 5 percent level of significant. So, This study accepted H_1 Alternative hypothesis and rejected the H_0 Null hypothesis.

Rural of Pachiparai village**Pearson Chi-square**

Hypothesis for income and expenditure of forestry people.

Below the table described statistically as a result of collected data for following hypothesis.

- H_0 = Income is unsuitable molecule to identify the primary cooking energy consumption on economic value in the rural area of Pechiparai village.
- H_1 = Income is suitable molecule to identify the primary cooking energy consumption on economic value in the rural area of Pechiparai village.

Table 6 expresses the Pearson Chi-square test at the five percent level of significance to rural data and reflected as result of this, discovered that the test value is greater than table value ($21.686 > 12.6$). Hence, it rejects the null hypothesis and accepts the alternative hypothesis. Thereby, this result says that, income is a suitable base to know the cooking energy consumption on economic value in rural of selected area.

ANOVA;

- H_0 = There is no variations in expense of cooking energy among the different income groups of sample respondents in the rural area of Pachiparai village.
- H_1 = There is variations in expense of cooking energy among the different income groups of sample respondents in the rural area of Pachiparai village.

Table 7 brought out the data result on expense variations among the different income groups of the rural respondents of Pachiparai village. Thereby, as an analyzed result by data interpretations, there are

Table 5: Expense Variations in different income groups of the forestry sample respondents

	Sum of Squares	df	Mean square	F	Sig.
Between groups	17.733	2	8.867	28.500	0.000
Within groups	13.067	42	0.311		
Total	30.800	44			

*Significant at 5 per cent level

Table 6: Test on Income and energy expenditure of rural people

Test	Value	df	Asymp.sig (2-sided)	Table value	Result
Pearson Chi-square	21.686	6	0.001	12.6	Rejected

Table 7: Expense Variations in different income groups of the rural sample respondents

	Sum of Squares	df	Mean square	F	Sig.
Between groups	14.933	2	7.467	17.552	0.000
Within Groups	17.867	42	0.425		
Total	32.800	44			

*Significant at 5 per cent level

significant variations in expense of cooking energy among income groups of the respondents at 5 percent level of significant. Hence, this study accepted H_1 Alternative hypothesis and rejected the H_0 Null hypothesis.

Results and Discussion

Based on the result of this study, the factor income is considered as a good ground to perceive the cooking energy consumption in selected boundaries. According to the collected data in the forestry of Pechiparai village, out of 45 respondents 38 of them consumes energy for below ₹ 1000 because, most of them are rolling their lifestyle in cooking by depending on firewood and kerosene. Due to forestry acts, people are unable to use amount of firewood as much of their demand (social ceremony) so, in this situation, they have to pay to get sufficient energy on demand based cost. However, the efforts of government in supply of alternative cooking energy, has not been prioritized among them due to availability of feasible equipments and prevailing of everyday satisfaction in collecting and consumption of primary energy. Thus it is, high income group of people who spends more than ₹1500 for energy consumption. They spends for energy not only for cooking purpose but, also for heating and food preparing for pets, moreover some of them buy firewood and kerosene at enbloc to distribute domestically in appropriate cost. Among the 45 rural respondents, 15 of them in middle income group spends up to 1500 rupees for their primary energy consumption as the price of firewood cost ₹ 25-35 per lift (in Tamil - 'thooku') (contains 10-15 kg) and kerosene also the same per liter. This data reflects, the original efficient of rural people in cooking energy consumption because, forestry people are responsible to distribute firewood at affordable price. On the other hand, rural respondents are the distributor of kerosene in equaling price of firewood. So, the consumption of primary energy for cooking is common due to internal reasons such as, food taste, availability of vessels and economic ability to fulfill their energy need daily. Thereby, there is inter-relationship between rural and forestry people in trading of primary cooking energy as both boundaries are regular consumers of the village.

Moreover, Fig. 1 results clearly say that out of ninety respondents in the village, thirty eight respondents are spending ₹ 501-1000 for their energy consumption. Because of civilisation of the village is empowering energy trade within themselves so, energy for free of cost is almost impossible in rural of village. And thirty six respondents are coming under below ₹ 500 expense group due to possible situation of energy trade within forestry of the village for free of cost but not as much of demand. Finally, very less sixteen respondents from higher income group are spending more than ₹ 1001 for their energy consumption because of their basic energy needs have been fulfilled by poor forestry people by supplying for minimum cost but their high expense for energy

purpose is alternative wants such as cooking for livestock, domestic industrial (making bricks) purposes and trade for rest of village (transporting domestic products).

Conclusion

Energy is a wider commodity that have been consumes throughout world without economic disparities due to its availability and feasibility. But, recent growth on education unto research has made all to know the importance and consumption pattern of energy along with sustainable development. Though, primary cooking have special renown among economic weaker section of the country even such alternatives prevailed throughout the same. This study pointed the consumption of primary cooking energy on economic value of income categorized rural and forestry respondents of Pechiparai village. Because, it is economically backward area and very less are found in permanent income jobs. No more income sources are available to the people except agricultural activities and cooli.

Suggestions

Given suggestions will support to further research and making policy for the favor of economic backward regions in consumption of cooking energy on their feasible economic power.

- In supply of alternative cooking energy, government must not produce a minimum number of beneficiaries.
- Authorities must access the real economic weaker section by conducting field surveys along with a detail of minimum standard of life.
- Inspection on implemented schemes and policies must be enhanced to identify whether beneficiaries are benefited or not?
- Special efforts should be taken to enrich the lifestyle of forestry people.
- Problems of people from economic weaker section must be probed and redressed.
- Provision of alternative cooking energy sources must be determined and managed perpetually.
- Subsidies or liberalization should be produced while the need of energy consumption advent too during social ceremonies of rural and forestry people. Because, people are faced problems during this time and they are not affordable to get from rest of the areas.

कन्याकुमारी जिले में पाचीपराई गांव के ग्रामीण एवं वानिकी में

प्राथमिक ऊर्जा खपत : एवं आर्थिक विश्लेषण

टी. समोस और के.आर. जयकुमार

सारांश

सामाजिक और आर्थिक स्तर पर उपभोक्ताओं के सशक्तिकरण के कारण परिवारों के विभिन्न उद्देश्यों के लिए ऊर्जा खपत पर अत्यधिक जोर दिया गया है। लोगों के आर्थिक वर्गीकरण और क्षेत्रीय असमानताओं ने कुकिंग ऊर्जा

को व्यापारिक और गैर व्यापारिक किस्म में पृथक कर दिया है। मुख्यतः आय एक प्रमुख महत्वपूर्ण कारक है, जो पाचीपराई गांव के ग्रामीण एवं वानिकी क्षेत्रों में पाई गई है। कुल 90 उत्तरदाताओं का चयन किया गया और प्रत्येक सीमाओं (वानिकी और ग्रामीण) से 45 उत्तरदाताओं के रूप में वर्गीकृत किया गया। उपयुक्त सांख्यिकी साधनों, यथा-पीयर्सन चाई-स्कवॉयर और एनोबा द्वारा एकत्रित आंकड़ों का विश्लेषण किया गया ताकि आर्थिक मान पर कुकिंग ऊर्जा खपत में आय की शक्ति का पता लगाया जा सके। परिणाम और विचार-विमर्श में, आंकड़ों के उतार-चढ़ाव के कारणों को इंगित किया गया और आर्थिक रूप से कमजोर तबके के पक्ष में प्रभावी संस्तुतियां दी गई हैं।

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