Rural Household Petrol Energy Consumption in Srirangam Taluk of Tiruchirappalli District

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Abstract
This study examines the pattern and determinants of petrol energy consumption among rural households in Tiruchirappalli District, Tamil Nadu. The researcher used both primary and secondary data, and 250 sample households were selected. This paper reveals the influence of socio-economic factors, particularly family income on petrol usage. The major findings show that most households fall within a moderate income range and primary consumption petrol for transportation purposes, increasing the cost of petrol over the past decade, the rural dependence on petrol remains strong. The study concluded that the need for targeted policies promoting fuel efficiency, energy consumption and price stability to support sustainable rural development.
Keywords*: Rural energy consumption, Petrol Usage in Tiruchirappalli District, and Sustainable energy consumption*

Introduction

Energy Consumption patterns serve as critical indicators of socio-economic development, particularly in rural areas where access to diverse energy sources remains a challenge. Among the various forms of energy utilized, petrol continues to play a significant role, supporting household mobility, agricultural activities and small-scale industries. Understanding the consumption trends and determinants of petrol usage in rural households provides valuable insights into energy needs, economic behavior and policy impacts.

Tiruchirappalli District, located in the state of Tamil Nadu, is characterized by a mix of agrarian economies, small-scale industries and expanding rural infrastructure. Despite advancements in energy alternatives, petrol remains a vital energy source for many rural households, especially in supporting transportation and mechanized agricultural practices. However, there is limited empirical data that specifically focuses on rural petrol consumption patterns at the household level in this region.

The study seeks to examine the volume, purpose and socio-economic factors influencing petrol energy consumption among rural households in Tiruchirapalli District. The researcher analyzes the consumption patterns, expenditure shares and the impact of variables such income, occupation and alternative fuels, this research aims to contribute to deeper understanding of rural energy dynamics. The findings are expected to inform policymakers in designing targeted energy policies and sustainable development programs that address the specific needs of rural populations.

Statement of the Problem

In rural areas, energy consumption patterns are undergoing rapid transformation influenced by economic growth, technological advancements and changing lifestyles. Petrol energy is primarily used for transportation and mechanized activities, and remains an essential part of rural household energy consumption. However, rising petrol prices, environmental concerns and the push for alternative energy sources have created new challenges for rural households. In Tiruchirappalli District, while significant attention has been given to electricity and biomass usage, there is a noticeable gap in understanding the specific patterns, determinants and socio-economic implications of petrol consumption at the household level. Without detailed knowledge in this area, efforts to design effective energy policies, manage rural transportation needs and promote sustainable energy practices may be hampered. Therefore, a focused investigation into rural petrol energy consumption is crucial to address these gaps and support informed decision-making.

Objectives of the Study

1. To identify the key socio-economic factors influencing petrol energy consumption of the sample household in Tiruchirappalli District.
2. To examine the primary purpose of petrol used in rural households in the study area.
3. To assess the impact of petrol price fluctuations on rural household consumption behaviors of sample households in the study area.

Hypotheses for the Study

1. There is an insignificant relationship between Income and Petrol Energy Consumption of Rural Households in Tiruchirappalli District.
2. There is an insignificant relationship between Price of Petrol and Petrol Consumption pattern in the study area.

Methodology

This research paper is based on both primary and secondary data. The researcher adopts the random sampling method, selecting SriRangam Taluk based on a pilot survey. Totally five potential villages are identified based on the 2011 census. Each village 25 samples were selected in total 250 sample households were selected for the study. The Secondary data was collected from the various Government Websites, Journals, Books, News, and Reports.

Result and Discussions

Table – 1: Total Family Income of the Sample Household in Tiruchirappalli District

	Below Rs. 25,000	Rs. 25,001 – Rs. 50,000	Rs. 50,001 – Rs. 75,000	Above Rs. 75,001	Total
Andhanallur	13 (26.00)	21 (42.00)	09 (18.00)	07 (14.00)	50
Jeyapuram	15 (30.00)	19 (38.00)	10 (20.00)	06 (12.00)	50
Pettavaithalai	12 (24.00)	25 (50.00)	08 (16.00)	05 (10.00)	50
Kambarasampettai	18 (36.00)	22 (44.00)	10 (20.00)	00 (00.00)	50
Koppu	14 (28.00)	20 (40.00)	09 (18.00)	07 (14.00)	50
Total	72 (28.80)	107 (42.80)	46(18.40)	25 (10.00)	250

Source: Computed from Primary Data

Note: Percentages in the Parenthesis

Table – 1 reveals the total family income of the sample household in Tiruchirappalli District. In Andanallur Village, out of 50 sample households, 42 (21) percentages of the sample households family income is Rs. 25,001 to Rs. 50,000 per month, 26 (13) percentages of the sample households family income is Below Rs. 25,000 per month, 18 (09) percentages of the sample households family income is Rs. 50,001 to Rs. 75000 per month, 14 (07) percentages of the sample households family income is above Rs. 75,001 per month in the study area.

In Jayapuram Village, out of 50 sample households, 38 (19) percentages of the sample households family income is Rs. 25,001 to Rs. 50,000 per month, 30 (15) percentages of the sample households family income is Below Rs. 25,000 per month, 20 (10) percentages of the sample households family income is Rs. 50,001 to Rs. 75000 per month, 12 (06) percentages of the sample households family income is above Rs. 75,001 per month in the study area.

In Pettavaithalai Village, out of 50 sample households, 50 (25) percentages of the sample households family income is Rs. 25,001 to Rs. 50,000 per month, 24 (12) percentages of the sample households family income is Below Rs. 25,000 per month, 16 (08) percentages of the sample households family income is Rs. 50,001 to Rs. 75000 per month, 10 (05) percentages of the sample households family income is above Rs. 75,001 per month in the study area.

In Kambarasampettai Village, out of 50 sample households, 44 (22) percentages of the sample households family income is Rs. 25,001 to Rs. 50,000 per month, 36 (18) percentages of the sample households family income is Below Rs. 25,000 per month, 20 (10) percentages of the sample households family income is Rs. 50,001 to Rs. 75000 per month in the study area.

In Koppu Village, out of 50 sample households, 40 (20) percentages of the sample households family income is Rs. 25,001 to Rs. 50,000 per month, 28 (14) percentages of the sample households family income is Below Rs. 25,000 per month, 18 (09) percentages of the sample households family income is Rs. 50,001 to Rs. 75000 per month, 14 (07) percentages of the sample households family income is above Rs. 75,001 per month in the study area. Therefore, out of 250 sample respondents 43 (107) percentages of the sample households' family income is Rs.25,001 to Rs. 50,000 per month in the study area.

Table – 2: Petrol Used Per Month by the Sample Household in the Study Area (Per Month)

	Below 10 Liters	11 Liter – 20 Liters	21 Liters – 30 Liters	Above 31 Liters	Total
Andhanallur	07 (14.00)	23 (46.00)	15 (30.00)	05 (10.00)	50
Jeyapuram	06 (12.00)	26 (52.00)	18 (36.00)	00 (00.00)	50
Pettavaithalai	05 (10.00)	22 (44.00)	17 (34.00)	06 (12.00)	50
Kambarasampettai	08 (16.00)	28 (56.00)	14 (28.00)	00 (00.00)	50
Koppu	09 (18.00)	21 (42.00)	12 (24.00)	08 (16.00)	50
Total	35 (14.00)	120 (48.00)	76 (30.40)	19 (07.60)	250

Source: Computed from Primary Data
Note: Percentages in the Parenthesis

Table – 2 reveals that the petrol used per month by the sample household in Tiruchirappalli District. In Andanallur Village, out of 50 sample households, 46 (23) percentages of the sample households used 11L to 20L petrol per month, 30 (15) percentages of

the sample households used 21L to 30 L petrol per month, 14 (07) percentages of the sample households used below 10L petrol per month, 10 (05) percentages of the sample households used above 31L petrol per month in the study area.

In Jayapuram Village, out of 50 sample households, 52 (26) percentages of the sample households used 11L to 20L petrol per month, 36 (18) percentages of the sample households used 21L to 30 L petrol per month, 12 (07) percentages of the sample households used below 10L petrol per month in the study area.

In Pettavaithalai Village, out of 50 sample households, 44 (22) percentages of the sample households used 11L to 20L petrol per month, 34 (17) percentages of the sample households used 21L to 30L petrol per month, 12 (06) percentages of the sample households used above 31L petrol per month, 10 (05) percentages of the sample households used below 10L petrol per month in the study area.

In Kambarasampettai Village, out of 50 sample households, 56 (28) percentages of the sample households used 11L to 20L petrol per month, 28 (14) percentages of the sample households used 21L to 30L petrol per month, 16 (08) percentages of the sample households used below 10L petrol per month in the study area.

In Koppu Village, out of 50 sample households, 42 (21) percentages of the sample households used 11L to 20L petrol per month, 24 (12) percentages of the sample households used 21L to 30L petrol per month, 18 (09) percentages of the sample households used below 10L petrol per month, 16 (08) percentages of the sample households used above 31L petrol per month in the study area.

Therefore, out of 250 sample respondents 48 (120) percentages of the sample households 11L to 20L of petrol used per month in the study area.

Table – 3: Purpose of Petrol Used By Sample Household in the Study Area

	Travelling	Electricity	Agricultural	Business	Total
Andhanallur	28 (56.00)	09 (18.00)	13 (26.00)	00 (00.00)	50
Jeyapuram	25 (50.00)	07 (14.00)	18 (36.00)	00 (00.00)	50
Pettavaithalai	24 (48.00)	11 (22.00)	15 (30.00)	00 (00.00)	50
Kambarasampettai	22 (44.00)	08 (16.00)	16 (32.00)	04 (08.00)	50
Koppu	29 (58.00)	10 (20.00)	09 (18.00)	02 (04.00)	50
Total	128 (51.20)	45 (18.00)	71 (28.40)	06 (02.40)	250

Source: Computed from Primary Data
Note: Percentages in the Parenthesis

Table 3 explains the purpose of petrol used by the sample households in the study area. In Andanallur Village, out of 50 sample households 56 (28) percentages of the sample household using petrol for travelling, 26 (13) percentages of the sample households using petrol for agricultural activity and 18 (09) percentages of the sample households using petrol for alternative for electricity in the study area.

In Jayapuram Village, out of 50 sample households 50 (25) percentages of the sample household using petrol for travelling, 36 (18) percentages of the sample households using petrol for agricultural activity and 14 (07) percentages of the sample households using petrol as an alternative for electricity in the study area.

In Pettavaithalai Village, out of 50 sample households 48 (24) percentages of the sample

household using petrol for travelling, 30 (15) percentages of the sample households using petrol for agricultural activity and 22 (11) percentages of the sample households using petrol for alternative for electricity in the study area.

In Kambarasampettai Village, out of 50 sample households 44 (22) percentages of the sample household using petrol for travelling, 32 (16) percentages of the sample households using petrol for agricultural activity, 16 (08) percentages of the sample households using petrol for alternative for electricity and 08 (04) percentages of the sample households using petrol for other purpose in the study area.

In Koppu Village, out of 50 sample households 58 (29) percentages of the sample household using petrol for travelling, 20 (10) percentages of the sample households using petrol for alternative for electricity, 18 (09) percentages of the sample households using petrol for agricultural activity and 04 (02) percentages of the sample households using petrol for other purpose in the study area.

Therefore, out of 250 sample respondents 51 (128) percentages of the sample households used petrol for travelling in the study area.

Table 4 Last 10 Years of Petrol Price in Tiruchirappalli District

Year	Average Petrol Price (In Rs.)
2015	60.50
2016	64.38
2017	69.99
2018	78.52
2019	73.83
2020	80.43
2021	95.41
2022	95.00
2023	98.00
2024	100.00

Source: https://chatgpt.com/c/680e3d10-f970-800c-9e52-ab2d695d37cd

Table – 4 explains the last 10 years of average price list. From 2024 – 2015 the petrol price is very high. In 2024 the average price is Rs. 100 and the lowest price is Rs. 60.50 in 2015. Every year the petrol price is gradually increased from 2015 to 2024.

Statistical Illustration – I

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.853a	.727	.726	.422
a. Predictors: (Constant), Family Monthly Income				

ANOVA[b]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	117.821	1	117.821	660.847	.000a
	Residual	44.215	248	.178		
	Total	162.036	249			
a. Predictors: (Constant), Family Monthly Income				b. Dependent Variable: Petrol Used Liter Per Month		

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.767	.066		11.635	.000
	Family Monthly Income	.739	.029	.853	25.707	.000
a. Dependent Variable: Petrol Used Liter Per Month						

R = 0.853; R2 = 0.727; F = 660.847 and T = 11.635

H0: There is an insignificant relationship between Income and Petrol Energy Consumption of Rural Household in Tiruchirappalli District.

The Statistical Illustration reveals the correlation between family income and petrol energy consumption in the study area. The F and T test values show the high positive correlation between family income and petrol energy consumption. Therefore the null hypothesis is rejected and an alternative hypothesis is framed.

H1: There is a significant relationship between Income and Petrol Energy Consumption of Rural Household in Tiruchirappalli District.

Statistical Illustration –II

Test Statistics		
	Purpose of the Petrol Used	Price of the Petrol
Chi-Square	125.776a	.000b
df	3	9
Asymp. Sig.	.000	1.000
a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 62.5.		
b. 10 cells (100.0%) have expected frequencies less than 5. The minimum expected cell frequency is 1.0.		

H0: There is an insignificant relationship between Price of Petrol and Petrol Consumption pattern in the study area

The Chi-Square value is 125.776 with 3 degrees of freedom and an Asymp. Sig. (p-value) of 0.000.

Since the p-value is less than 0.05, we reject the null hypothesis.

This means there is a significant relationship between the purpose of petrol use and petrol consumption patterns in the study area.

H1: There is a significant relationship between Price of Petrol and Petrol Consumption pattern in the study area

Major Findings

1. 43 (107) percentages of the sample households monthly family income is Rs. 25,001 to 50,000 per month in the study area.
2. 48 (120) percentages of the sample households 11L to 20L of petrol used per month in the study area.
3. 51 (128) percentages of the sample households using petrol for travelling in the study area.
4. From 2015 – 2024 the petrol price is very high. In 2024 the average price is Rs. 100.
5. The lowest price was Rs. 60.50 in 2015. Every year the petrol price is gradually increased from 2015 to 2024.
6. The Statistical Illustration reveals the correlation between family income and petrol energy consumption in the study area. The F and T test values show the high

positive correlation between family income and petrol energy consumption. Therefore the null hypothesis is rejected and an alternative hypothesis is framed.

7. The Chi-Square value is 125.776 with 3 degrees of freedom and an Asymp. Sig. (p-value) of 0.000. Since the p-value is less than 0.05, we reject the null hypothesis.
8. This means there is a significant relationship between the purpose of petrol use and petrol consumption patterns in the study area.

Suggestions

1. Government has taken an initiative for promotional activity for fuel consumption especially for traveling.
2. Reduce the tax rate of petrol and make price stability measures.
3. Awareness campaigns can be initiated to educate consumers on energy conservation practices to reduce overall petrol consumption.

Conclusion

The study on rural household petrol energy consumption in Tiruchirappalli District reveals critical insights into the patterns, determinants and socio-economic factors influencing fuel use. It is evident that a major portion of the households fall within a moderate income range and primarily use petrol for travelling purposes, with the majority consuming. The statistical analysis demonstrates a strong positive correlation between family income and petrol consumption, indicating that higher income levels lead to greater fuel usage. The study confirms a significant relationship between the purpose of petrol use and consumption patterns, although the price of petrol does not significantly impact consumption behavior. Despite the steady rise in petrol prices over the last decade. Rural households continue to depend heavily on petrol for essential activities. These findings highlight the need for strategic policy interventions focusing on promoting energy conservation, stabilizing petrol price and encouraging the use of fuel-efficient alternatives to ensure sustainable rural energy management.

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