Energy consumption of rural Households in Cuddalore district of Tamil Nadu

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ABSTRACT

Energy is the universal measure of all kinds of work, and its consumption has been increasing worldwide. It has become a basic requirement of today's life. It is the backbone of present-day civilization. Thus, with an increase in the living standard of human beings, the energy consumption is also accelerated. The availability of energy is an important determinant of the quality of life in human settlements. An exploratory study was carried out on household level to find out the energy consumption pattern and consumer Energy is one of the fundamental factors in the functioning of any civilized society needed to improve better life style and socio-economic development of the country. More than half of the world's population live in rural areas, who depend mostly on biomass for their energy supply, and have no access to modern form of energy. In many developing countries in Asia like India, Pakistan, Myanmar, Nepal and Bangladesh, the rural household energy consumption constitutes over 70% to the national energy use of Households are the foremost end user of biomass and commercial energy, which varies between rural and urban populations, between low and high-income groups within a country.

Keywords: Consumption Pattern, Consumer Energy, Economic Development, Rural areas.

DOINumber: 10.48047/NQ.2022.20.20.NQ109049 **NeuroQuantology2022;20(20): 457-463**

Introduction

The word "Energy" is derived from the Greek word 'energeia,' which means 'in work.' It is the power or capacity to do work. Energy has become an important and one of the basic infrastructures for human development and economic growth of a country. Energy is the universal measure of all kinds of work, and its consumption has been increasing worldwide. It has become a basic requirement of today's life. It is the backbone of present-day civilization. Thus, with an increase in the living standard of human beings, the energy consumption is also accelerated. The availability of energy is an important determinant of the quality of life in human settlements. An exploratory study was carried out on household level to find out the energy consumption pattern and consumer Energy is one of the fundamental factors in the functioning of any civilized society needed to improve better life style and socio-economic development of the country. More than half of the world's population live in rural areas, who depend mostly on biomass for their energy supply, and have no access to modern form of energy. In many developing countries in Asia like India, Pakistan, Myanmar, Nepal and Bangladesh, the rural household energy consumption constitutes over 70% to the national energy use of Households are the foremost end user of biomass and commercial energy, which varies between rural and urban populations, between low and high-income groups within a country.

Energy is the most basic material demand for the existence and development of human being. Energy consumption is used as the criterion for measuring the level of economic and social development for a

eISSN 1303-5150

certain region. Due to the energy crisis and other environmental, economic, political, market, and social issues, researchers have sought to develop sustainable and renewable energy sources to reduce energy consumption, protect the environment, and promote regional development. Even though rural households often have an easy access to traditional forms of energy-firewood, charcoal and agricultural residues-to fulfil their basic energy needs, these fuels carry adverse effects, such as emissions of particulate matter that are harmful to health, deforestation and environmental degradation. Electricity is an important form of fuel. The use of different forms of fuel is unlimited. Right from cooking the food, different forms of fuel are used. The rapid growth of urban areas in developing countries has been accompanied by a huge surge in the demand for household fuels and electricity. Electricity is an important origin of energy and fuel. The use of electricity is for numerous purposes, such as lighting, running of electric trains and for running industrial units in the beginning electricity was generated by using the reservoirs and it is called hydro-electricity.

Review of Literature

Guozhu Li et al. (2016) the results indicate obvious differences in rural household energy consumption among the different types of villages, although they shared the distinctive feature of utilizing a combination of energy sources; however, the level of rural household energy consumption is relatively low. In the mountainous areas, households mainly depend on straw and use coal, animal manure, solar energy, wood, and bio-gas as auxiliary energy sources. In the semi-mountainous areas, households mainly depend on coal and use straw, wood, and solar energy as auxiliary energy sources. In the plains areas, households mainly depend on coal and use grass, straw, solar energy, and wood as auxiliary energy sources. Energy used for cooking and heating, both of which are required for basic survival, accounted for most of the energy consumption. In the hilly, mountainous areas, households relied on kangs an integrated system for cooking, sleeping, household heating, and ventilation) for heat in the winter. In the semi-mountainous areas, households used both kangs and stoves for heat. In the plains along the river district, households primarily depended on stoves for heat.

Dhanushkodiet al. (2016) The study was conducted to investigate the energy consumption pattern in small scale cashew nut processing industries located in Panruti taluk,

Cuddalore district, Tamilnadu, India (Latitude 15o 11’ and 12o 35’; Longitude 78o 38’ and 80o 0’) . Three different small cashew processing industries based on the fuel used for drying of cashew kernel are considered for this study. The study compares the energy utilization, specifi c energy consumption and energy intensity of processing raw cashew nut. The energy input for drying of raw cashewnut, steaming, cooling and tempering, cutting and separation, drying of cashew kernel, kernel cooling, peeling of kernel and grading and packing were quantified using standard equation available in the literature. The total energy consumption for processing 1000 kg of raw cashew nuts were 5866.2 MJ, 5911.69 MJ, 6897.36 MJ for electrical drying, steam drying and biomass drying industries respectively. It was observed that 95% of energy is used for cashew kernel drying, raw cashew nut drying and steaming of raw nut. Energy intensity of cashew processing varied from 1.5 MJ/kg to 3 MJ/kg.

Objectives of the Study

The main objectives of the study are

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a) To study the different households of energy used by the people of this study area.
b) To examine the level of energy consumption of this study area

Methodology

For this study, both primary as well as secondary data were used. For the present study, the researcher has selected …….. households randomly. Simple random sampling method was adopted for data collection. The collected data were processed and analysed with appropriate statistical tools. Secondary data were collected from leading journals, books, government reports, unpublished research works and internet. The study involves income and expenditure information as well as other social and demographic survey and the consumption pattern of household energy utilization scenario in the disregarded rural areas of cuddalore District, Tamilnadu.

What does renewable energy offer rural areas?

The global deployment of RE has been expanding rapidly. For instance, the RE electricity sector grew by 26% between 2005 and 2010 globally and currently provides about
20% of the world's total power (including hydro-power). Rural areas attract a large part of investment related to renewable energy deployment, tending to be sparsely populated but with abundant sources of RE. The case studies have found that RE deployment can provide hosting communities with some benefits, including:

- New revenue sources. RE increases the tax base for improving service provision in rural communities. It can also generating extra income for land owners and land-based activities. For example, farmers and forest owners who integrating renewable energy production into their activities have diversified, increased, and stabilized their income sources.
- New job and business opportunities, especially when a large number of actors is involved and when the RE activity is embedded in the local economy. Although RE tends to have a limited impact on local labour markets, it can create some valuable job opportunities for people in regions where there are otherwise limited employment opportunities. RE can create direct jobs, such as in operating and maintaining equipment. However, most long-term jobs are indirect, arising along the renewable energy supply-chain (manufacturing, specialised services), and by adapting existing expertise to the needs of renewable energy.
- Innovations in products, practices and policies in rural areas. In hosting RE, rural areas are the places where new technologies are tested, challenges first appear, and new policy approaches are trialled. Some form of innovation related to renewable energy has been observed in all the case studies. The presence of a large number of actors in the RE industry enriches the "learning fabric" of the region. Small and medium-sized enterprises are active in finding business niches as well as clients and valuable suppliers. Even when the basic technology is imported from outside the region, local actors often adapt it to local needs and potentials.
- Capacity building and community empowerment. As actors become more specialized and accumulate skills in the new industry, their capacity to learn and innovate is

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enhanced. Several rural regions have developed specific institutions, organisms, and authorities to deal with RE deployment in reaction to large investment and top-down national policies. This dynamic has been observed both in regions where local communities fully support RE and in regions where the population is against potentially harmful developments.

- Affordable energy. RE provides remote rural regions with the opportunity to produce their own energy (electricity and heat in particular), rather than importing conventional energy from outside. Being able to generate reliable and cheap energy can trigger economic development.

Energy use, Income, and the Energy Ladder

An overview of the main forms of energy used in rural areas of developing countries indicates that the general pattern is to move from biofuels, and human and animal power, to a mix of traditional and modern fuels (Table 1). The main energy end-uses are cooking, lighting, running appliances, and sometimes space heating. For cooking, wood is the fuel of choice. When wood becomes scarce, people generally turn to agricultural residues or animal dung. In more prosperous regions, people may use kerosene or coal. In regions with significant numbers of livestock, biogas is sometimes used. For lighting, the poor and those lacking access to electricity use candles or kerosene. Wealthier households use electricity if it is available because it is convenient and produces superior lighting. For agriculture and rural industry, the general pattern is to move from human and animal power to mechanical power. For process heat, the trend is to move to more efficient use of biomass, as well as to modern fuels.

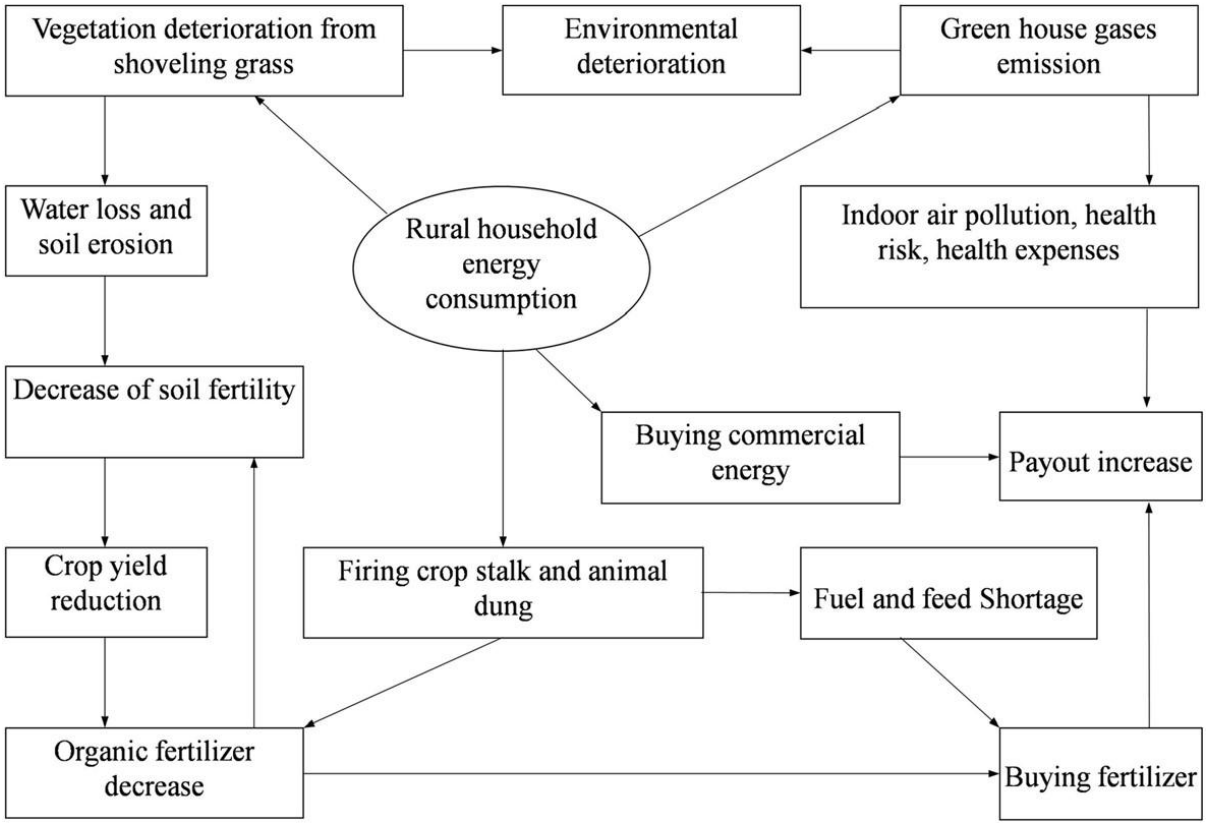
Table 1 Rural energy use patterns in rural households in the study area.

Income stage			
End use	**Low**	**Medium**	**High**
Household			
Cooking	Wood, residues, and dung	Wood, residues dung, kerosene, and biogas	Wood, kerosene, biogas, LPG, and coal
Lighting	Candles and kerosene (sometimes none)	Candles, kerosene, and gasoline	Kerosene, electricity and gasoline
Space heating	Wood, residues, and dung (often none)	Wood, residues, and dung	Wood, residues, dung, and coal
Other appliances	None	Electricity and storage cells	Electricity and storage cells

Movement up the “rural energy ladder” can be smoothed and sustained by policies and investments that emphasize both affordability and efficiency. Gains in efficiency for cooking can be made in small steps. For example, a farmer who uses wood for cooking may be able to afford an improved biomass stove long before being able to switch to liquid petroleum gas (LPG). For lighting, however, the differences in efficiency between biomass and kerosene on the one hand and electricity on the other

are so large that the recommended path is to move quickly to some form of electric lighting, such as incandescent or fluorescent lamps.

Fig. 1 Rural energy consumption's impact on the environment and the economy



Woodstove Programs

Simple and inexpensive woodstoves designed for use by low-income households can double the energy efficiency of wood use, reduce indoor air pollution, and reduce the cost of wood and the time spent gathering it. Despite these apparent benefits, many developingcountry households have failed to adopt improved stoves. Early programs in the late 1970s and Early 1980s, supported by developing-country governments, donors, NGOs, and others, assumed that the benefits were self-evident. They believed people would adopt the improved stoves quickly and that an initial intervention would lead seamlessly to a self-sustaining program. Hence, most early efforts were focused only on dissemination, and such factors as local customs, the economic setting, and the availability and prices of local biofuels were essentially ignored. These early efforts were based on an overestimation of the energy efficiency of the improved stoves in regular use and underestimation of the efficiency of traditional stoves. Successful programs were expected to decrease wood consumption by 75% or more. Today, a decrease of 25% is considered realistic. As a consequence of their perhaps naive approach, many early programs failed.

Results

Rural energy sources in the study area include: Fuel wood, Charcoal, Agricultural Residues, and very little amount of kerosene fuel, dry cell batteries, hydro-electricity, solar energy and small factory by-products. Energy sources application for different household activities include cooking (fuel wood, charcoal and agricultural residues), space heating (fuel wood and charcoal), Lighting (hydro-electricity, fuelwood, kerosene and dry cell batteries), entertainment appliances powering (hydro-electricity and

eISSN 1303-5150

dry cell batteries) and Rural Telephone powering (solar power).

The household energy consumption rates (Kg/person/day) of the area figures: fuelwood (4.5), charcoal (0.05), agricultural residues (0.52). Traditional fuels contributed 99.8% of rural energy consumption in the study area, with fuel wood being by far the most important (87.4%), followed by agricultural residues (10.8%), and small amount of charcoal (1.6%). The remnant energy demand of the rural household is met from kerosene; hydroelectricity, dry cell batteries, and small factory by-products like saw dust and coffee husk.

Conclusion

The present study reveals that the consumption pattern of energy sources wholly depends upon the availability of the energy sources, and the level of income of the people. Among the sources of energy, fuel wood is easily available to the sample population in the study area. Therefore, they consume huge amount of fuel wood than other sources. The respondents use LPG very limitedly as its cost is comparatively high. Most of the people in the study area, get fuel wood from their own field. Hence, people avoid-using LPG to save money Rural areas studied is characterized by covering almost the whole household energy consumption by fuel wood and very insignificant of free and renewable energy sources, such as hydro and solar energy sources. Vast majority of the rural household (more than 97%) use traditional cooking and baking stoves well known in losing fuel energy and very low level of promotion and access to improved rural energy technologies was also identified as main factor aggravating deforestation and health problems of rural families. Leaving rural inhabitants to continue on the course of the current use pattern of traditional energy sources, will have highly negative consequences for the rural economy at large, as well as the environment and the ecosystem balance.

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eISSN 1303-5150