ENERGY USE AND CHOICES IN A TRIBAL REGION: AN EMPIRICAL STUDY FROM MANIPUR, INDIA

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Overview

This paper examines the pattern of household energy consumption and explores the factors influencing cooking energy choice in the state of Manipur, India. Energy is a vital factor for development of any region or country. At the micro level, energy's role is increasingly recognized through higher productivity, income opportunities, improved health, and reduced labor and time spent on household tasks. The choice of energy that households make can have significant economic, environmental, and health implications. Ensuring universal access to modern, affordable, reliable, and sustainable energy is one of the main components of the Sustainable Development Goals. It is believed that access to modern energy can substantially influence human activities and well-being. However, it should not be assumed that energy access alone can guarantee improvements in people's well-being. Energy access, consumption, and demand vary widely across countries, states, and regions (Ravindra et al., 2019). Numerous studies have been conducted globally to analyze household energy consumption patterns and their influencing factors. In contrast, the literature about the North Eastern Region of India has been relatively silent, where challenges related to energy use are even more pronounced. According to the Central Electricity Authority's report for 2020-21 (Government of India), Manipur has one of the lowest per capita availability of power in India and it is one of the least non-performing states in terms of meeting energy security standards among the northeastern states. The power shortage is a major factor contributing to the slow development of the state. The state has a very high concentration of tribal communities living in rural areas with severe poverty, underdevelopment, and limited access to modern energy. Geographically and politically, Manipur can be divided into two broad categories: valleys and hills. There is a sharp difference in terms of infrastructure facilities between the valley and the hill districts, with the former being the power center where the dominant community dwells and the latter predominantly inhabited by the tribes. While social transformation and growth depends on infrastructure development, the hills in Manipur is inadequately endowed with basic infrastructural facilities which limits the movement of goods, people, and ideas. Even basic needs such as all-weather roads connecting all villages, minimum electricity supply, health care centers, primary schools, and potable water remain inaccessible for most tribal communities in Manipur (Ziipao, 2020). The recent violent conflict in the state[1] has displaced thousands, destroying livelihoods and leaving many without access to basic necessities. The people in the hilly region primarily grow and sell oranges and naga chilies (commonly known as ghost peppers in international markets). However, due to road blockage, surplus products are left to rot, as villagers cannot transport them to the market. Additionally, energy delivery for households, including LPG, has been severely delayed, affecting energy consumption. This study examines pattern of household energy consumption in Manipur and investigates the factors influencing cooking fuel choices. Notably, Manipur differs from other Indian states due to its lack of medium and large-scale industries, resulting in low industrial energy consumption and high domestic demand (Government of Manipur, 2017, cited in Ziipao, 2020). The study offers valuable insights for policymakers to develop sustainable energy solutions addressing the region's specific needs.

Methods

The study is based on primary data collected through a field survey carried out in the hill district of Tamenglong in the western part of Manipur. Multi-stage sampling procedure is used to collect data from the households. The district is considered to be one of the backward districts in Manipur and lack many basic infrastructural facilities. A mixed data collection strategy is used, where the questions are designed to capture both qualitative and quantitative data collected during December 2023 and January 2024. The sample size considered for the study is 208. In addition to use of simple statistical tools, such as frequency, percentage, mean, and standard deviations, a multinomial logistic regression model is used to identify and analyze the factors influencing household energy choice for cooking with the help of STATA 17.

Results

The analysis of primary data reveals that access to modern energy for lighting (electricity) has improved in the district, but economic and cultural barriers to modern cooking energy (LPG) remain. With respect to energy for lighting, all households in the surveyed areas are found to be electrified. However, despite the significant progress,

[1] Note: A violent ethnic clash broke out in Manipur on May 3, 2023. It has persisted for nearly two years, reaching the 21-month mark as of January 2025.

there is a power shortage where households face power outages at least once daily, associated with a recurrent phenomenon of load shedding. It is reported that electricity is very irregular, especially during the monsoon season. Unreliable power is a significant barrier to economic and social development (IEA, 2021). The breakdown of electrical infrastructure, such as poles, wiring, and transformers, results in prolonged repair and replacement times, often spanning months. In the absence of qualified personnel, villagers assume the responsibility despite lacking professional training, leading to a heightened risk of electrocution, with multiple incidents reported. The villages struggle with irregular electricity supply and an inefficient system for billing, collecting, and paying for lighting. A single billing system exists in all the villages surveyed, and a lump sum of bills is created for the whole village. Regarding energy sources for cooking, most households are found to use more than one type of energy simultaneously. The surveyed households are divide into three categories based on the type of energy used for cooking, i.e., traditional energy (firewood), mixed energy (mix of firewood, LPG, and electricity), and modern energy (LPG and electricity). Mixed energy is found to be the dominant energy source for cooking, with 66 percent of households using both traditional and modern energy, followed by 21 percent using only modern energy. Hardly 13 percent of households use traditional energy only for cooking. Thus, the findings prove that households in the tribal district of Manipur prefer fuel stacking rather than ascending the energy ladder. This fuel stacking might be due to free access to firewood, affordability issues of modern energy, preferences, and energy security purposes. Despite being aware of the free LPG connection initiative, many households are not familiar with the specifics of the *Pradhan Mantri Ujjwala Scheme*, an initiative of Government of India to provide clean cooking fuel. Furthermore, the absence of doorstep delivery of LPG cylinders in the surveyed region forces households to rely on local agents or intermediaries, incurring additional costs. The results of Multinomial Logit regression reveals that location of the households (town or village), gender of the household head, type of dwelling, tropical livestock units, income, and cultural factors contributed significantly to the choice of energy in the household. Households located in town are less likely to use traditional fuels due to better access to modern energy. Female-headed households tend to avoid mixed energy sources, as women bear the bulk of collecting and cooking responsibilities. Higher-income households are found to prefer modern energy over traditional fuels, investing in sustainable options. Households in pucca dwellings are less likely to use mixed energy, prioritizing cleanliness and minimizing pollution. Cultural considerations often lead households to choose mixed energy sources for cooking.

Conclusions

Adoption of modern energy services faces numerous barriers. The issue goes beyond supply-side challenges, as demand-side factors also play a significant role. Households are reluctant to adopt prepaid electricity systems, which require higher payments than the current system. People's low purchasing power is found to be a major hindrance to accessing modern and clean energy. Furthermore, irregular energy supply discourages households from adopting metering energy systems. While subsidies may temporarily increase the uptake of modern energy sources like LPG for cooking, they are not a sustainable solution. The high cost of LPG refills poses a significant barrier for low-income households. Ultimately, the lack of knowledge and understanding about the benefits and accessibility of modern energy services presents a significant obstacle to widespread adoption. The study highlights the need for awareness programs to educate households about the benefits of modern energy sources, such as government schemes like PMUY, and the negative impacts of traditional energy on human health and the environment. Given the region's climate and topography, completely eliminating traditional energy sources may not be feasible, especially in rural areas. Additionally, cultural and sentimental factors, such as resistance to new technology and lack of awareness about modern energy services, also hinder adoption. The replacement of traditional fire hearths with modern gas cooking systems in rural settings can result in substantial cultural changes, influencing cooking traditions, kitchen design, and community autonomy in resource gathering, with associated economic factors. Instead, sustainable harvesting and use of firewood for household energy should be promoted. To accelerate the transition to modern energy, the government should implement a multi-faceted approach, including income-generating programs to enhance purchasing power, infrastructure development, comprising distribution centers, substations, transformers, and power lines and finally culturally sensitive policies, acknowledging the significant influence of income, location and cultural factors, on household energy choices, as highlighted by the study.

References

IEA (2021), India Energy Outlook 2021, IEA, Paris https://www.iea.org/reports/india-energy-outlook-2021

Ravindra, K., Kaur-Sidhu, M., Mor, S., & John, S. (2019). Trend in household energy consumption pattern in India: a case study on the influence of socio-cultural factors for the choice of clean fuel use. Journal of Cleaner Production, 213, 1024-1034.

Ziipao, R.R. (2020). Infrastructure of Injustice: State and Politics in Manipur and Northeast India https://lccn.loc.gov/2020001549