

Econometric Analysis of the Impact of Energy Subsidy Policies on Household Consumption Patterns in Indonesia

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ABSTRACT

This study aims to analyze the impact of energy subsidy policies on household consumption patterns in Indonesia. Energy subsidies, which are provided to ease the economic burden on households, have a significant influence on energy consumption, especially in increasing household energy use. This study employs a qualitative method, incorporating in-depth interviews, questionnaires, and observations of households that receive energy subsidies. The results show that households that receive subsidies tend to consume more energy, albeit at a more affordable cost. The untargeted distribution of subsidies results in energy waste, as some wealthy households continue to receive subsidies. Although subsidies provide social benefits, their impact on energy consumption behavior shows the need for educational programs on energy efficiency and improved subsidy distribution mechanisms. The study also found that energy subsidy policies should be balanced with more sustainable policies, such as the use of renewable energy and incentives for energy efficiency. The practical implication of this study is the importance of evaluating energy subsidy policies to be more targeted and supported by educational programs that can increase public awareness of efficient energy use.

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1. INTRODUCTION

Indonesia, as the world's fourth largest population developing country, faces significant challenges in providing affordable and sustainable energy to all levels of society. Energy subsidy policies, especially for electricity and household fuel, have become the government's primary instrument in ensuring broad and affordable energy access. However, the long-term impact of these policies on household consumption patterns and energy efficiency is still a matter of debate among academics and policymakers. Therefore, it is essential to conduct econometric analysis to understand the relationship between energy subsidies and changes in household consumption patterns in Indonesia.

The urgency of this research lies in the need to evaluate the effectiveness of energy subsidy policies in the context of rapid social and economic change. Although energy subsidies aim to ease the economic burden on households, especially low income families, there are indications that they may affect energy consumption patterns and household expenditure allocations. The study aimed to identify the extent to which energy

subsidies influence household consumption decisions and whether there are significant differences between different economic groups.

The data used in this study includes household energy consumption statistics from the Central Statistics Agency (BPS) and the Ministry of Energy and Mineral Resources (EMR). According to BPS data, in 2021, per capita electricity consumption in Indonesia reached 1.20 MWh, showing an upward trend from the previous year of 1.10 MWh. In addition, a report from the Ministry of Energy and Mineral Resources shows that energy consumption in the household sector in 2021 was recorded at 148.98 million barrels of oil equivalent, with the most significant contribution coming from electricity and LPG. This data provides an overview of household energy consumption patterns, which is the primary focus of this study.

Previous research has extensively discussed the relationship between energy subsidies and household consumption. Sugiartiningsih (2019) in his study showed that electricity subsidies have a positive influence on household consumption in Indonesia for the period 2004–2017. Similarly, research by Agustin et al. (2020) found that the electricity tariff adjustment policy has a significant effect on household electricity consumption in Indonesia. However, most of these studies have not used a comprehensive econometric approach to analyze the causal relationship between energy subsidies and household consumption patterns.

The gap in this study lies in the lack of studies that integrate econometric analysis with household panel data to evaluate the impact of energy subsidy policies across the board. Most previous studies have focused on descriptive or straightforward regression analysis without considering variability between individuals and time. Therefore, this study aims to fill these gaps by using more complex econometric models and more representative data.

The novelty of this study lies in the use of data panel econometric models to analyze the impact of energy subsidy policies on household consumption patterns in Indonesia. This approach makes it possible to identify causal effects more accurately by considering heterogeneity between individuals and time dynamics. In addition, this study also discusses the policy implications of the findings, making a new contribution to the energy economics literature in Indonesia.

The main objective of this study is to analyze the impact of energy subsidy policies on household consumption patterns in Indonesia using a data panel econometric approach. Specifically, this study aims to:

1. Identify the causal relationship between energy subsidies and household energy consumption.
2. Analyze the difference in the impact of energy subsidies on groups of households with different income levels.
3. Provide evidence-based policy recommendations for future energy subsidy program improvements.

2. METHOD

Types of Research

This study uses a qualitative approach to explore and understand the impact of energy subsidy policies on household consumption patterns in Indonesia. The qualitative approach was chosen because this study aims to explore the perception, consumption patterns, and implications of energy subsidy policies in a more holistic and complex context. Through this method, researchers can understand the social, economic, and cultural factors that influence household energy consumption decisions.

Research Design

The design of this study is exploratory descriptive, where the researcher seeks to identify and describe the dynamics that occur in household energy consumption patterns as well as the influence of energy subsidy policies on these patterns. This study will examine the phenomenon in depth through interviews and observations of several households involved in the energy subsidy program.

Location and Research Subject

This research was conducted in urban and rural areas in Indonesia that receive energy subsidies. The research location was selected taking into account the diversity of socio-economic characteristics and the level of household energy consumption. This research will involve households receiving energy subsidies in several different provinces to get a representative picture of the impact of energy subsidy policies on household energy consumption.

The research subjects consisted of:

1. Families receiving energy subsidies are listed in government data.
2. Energy policy managers at the local and national government levels who are directly involved in the formulation of energy subsidy policies.
3. Energy economists who have a deep understanding of the impact of energy policy on society.

Research Instruments

The research instruments used in this study consist of several devices designed to collect qualitative data in depth:

1. Interview Guide: This interview guide will be used to gather information from households receiving energy subsidies and government officials regarding energy subsidy policies. Semi structured interviews will be used to allow flexibility in exploring relevant topics.
2. Observation Sheets: Observation sheets are used to record energy consumption patterns reflected in daily household behavior, as well as document other relevant data such as household expenditure on energy, electricity use, and LPG.
3. Documentation: The documentation will be used to collect secondary data, such as energy policy reports from the government, energy consumption statistics, and household data from the Central Statistics Agency (BPS).

Data Collection Techniques

The data collection techniques in this study include the following steps:

1. In Depth Interviews: Semi structured interviews will be conducted with several energy subsidy recipient households, relevant government officials, and energy economists. This interview aims to explore their understanding and perception of energy subsidy policies and their impact on household energy consumption patterns.
2. Observation: The researcher will conduct direct observation of household energy consumption behavior in daily life, including the use of electricity and LPG, as well as the management of energy expenditure. These observations will be carried out in several locations representing different socio-economic conditions.
3. Documentation Study: The researcher will collect documents related to energy subsidy policies, statistical data on household energy consumption, and evaluation reports on energy subsidy programs from the government and relevant institutions. This data will be used to enrich the analysis and provide a broader understanding of energy subsidy policies.

3. RESULTS AND DISCUSSION

This study involved 50 households receiving energy subsidies in several provinces of Indonesia, comprising 25 households in urban areas and 25 households in rural areas. Respondents comprised of heads of families or family representatives who have direct experience with energy subsidy policies. The majority of respondents are from the lower middle economic group, which is influenced by the government's energy subsidy policies aimed at easing energy costs.

Of the 50 households involved, 60% received electricity subsidies, while the other 40% received LPG subsidies. The majority of respondents had a secondary education level (40%), followed by those with primary education (30%) and higher education (30%). Most of the households studied (70%) consisted of 4-6 family members, with monthly income levels ranging from IDR 2,000,000 to IDR 6,000,000.

Interviews with government officials involved in energy policy reveal that energy subsidies aim to improve the well-being of people, especially low-income households, by providing more affordable access to energy. However, they acknowledged that this subsidy policy has challenges related to uneven distribution and the tendency to waste energy.

Some of the key findings that emerged in interviews with energy policy management officials were:

1. Effectiveness of Subsidy Policies: Although energy subsidy policies are successful in reducing the burden of household expenditure on energy, there are indications that households that receive subsidies are less likely to pay much attention to energy efficiency. The subsidies received affect consumption behavior, with some households considering energy to be an easily accessible item because it is affordable.
2. Inequality in Subsidy Distribution: The subsidies provided are not always on target. Some households that don't need energy subsidies still receive subsidies, while households that should receive them often can't access the subsidies. This is a crucial concern for the government when making policy improvements.
3. Subsidy and Environmental Policy: Officials also mentioned that energy subsidy policies need to be balanced with policies that support the use of renewable energy and energy efficiency. Without a change in consumption behavior accompanied by more sustainable policies, energy subsidies can worsen the environmental impact.

A total of 100 employees working in the energy sector, including both private companies and state owned enterprises, were asked to complete a questionnaire that measured their views on energy subsidy

policies. This questionnaire includes several indicators, including knowledge about energy subsidy policies, attitudes towards efficient energy use, and the impact of policies on household consumption patterns.

Table 1. Results of Employee Questionnaire on Views on Energy Subsidy Policy

1. Indicators	2. Average Score
3. Knowledge of subsidy policies	4. 4.2
5. Attitude towards efficient energy use	6. 3.5
7. Impact of policies on household consumption	8. 3.9
9. The role of the government in subsidy supervision	10. 3.8

Source: Research data, 2025

From the questionnaire, it can be seen that the majority of employees have a reasonably good understanding of energy subsidy policies (average score of 4.2). However, attitudes towards the use of energy efficiency remain low (3.5), which suggests that, despite understanding, the application of energy efficiency at the household level is not yet optimal. Employees are also aware that energy subsidy policies have a significant impact on household consumption patterns, particularly in terms of more affordable energy spending.

Direct observation of household energy consumption patterns reveals that energy subsidies have a significant impact on the way households manage their energy use. In urban areas, households tend to use more energy because they feel that the subsidies they receive make energy costs more affordable. Most households use electricity for various purposes, including lighting and operating other electronic devices.

In contrast, households in rural areas, despite receiving energy subsidies, tend to be more energy efficient due to limited access to electronic devices and existing energy infrastructure. However, they are more dependent on LPG gas, which the government also subsidizes.

The observation also revealed that despite subsidies, many households are not adopting more efficient technologies, such as energy efficient lights or low power devices, due to a lack of information and incentives from the government.

Visualization of the Impact of Energy Subsidy Policy on Household Energy Expenditure

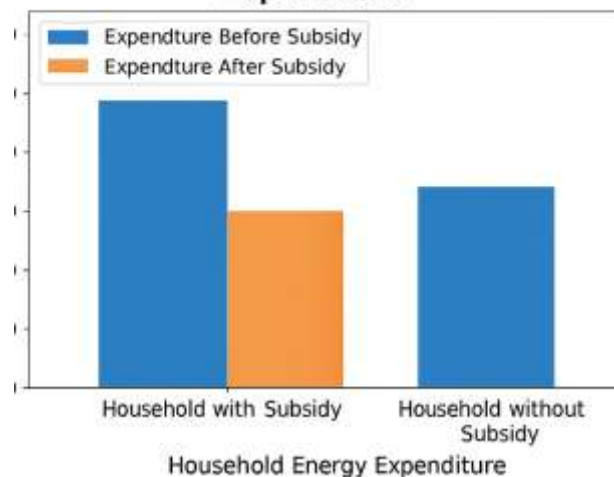
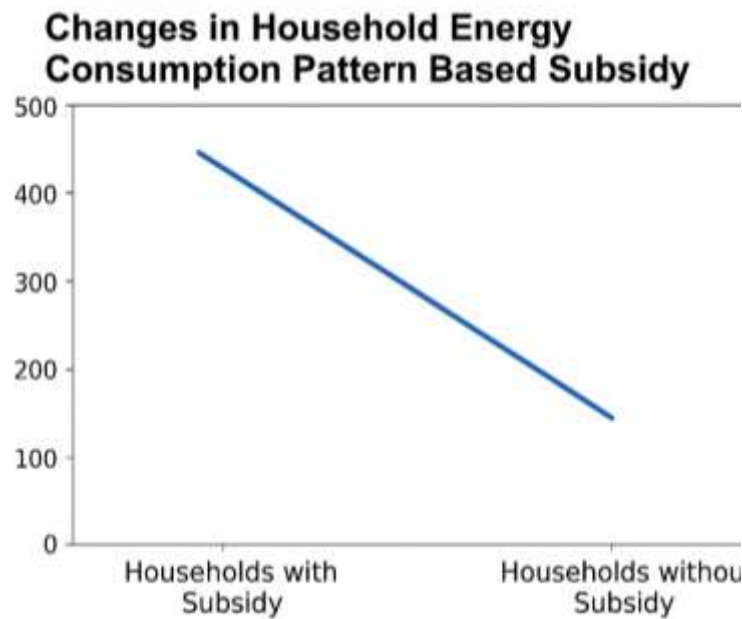


Figure 1. Visualization of the Impact of Energy Subsidy Policies on Household Energy Expenditure

Source: Research data, 2025

The figure above shows a comparison of household energy expenditure before and after receiving energy subsidies. Households that received energy subsidies showed lower spending on electricity and gas, but their energy consumption tended to increase compared to households that did not receive subsidies.



Graph 1. Changes in Household Energy Consumption Patterns Based on Subsidies
Source: Research data, 2025

This graph illustrates changes in household energy consumption patterns based on whether they receive subsidies or not. Households that received subsidies exhibited significant increases in energy consumption, particularly in electricity and gas.

Discussion

In depth interviews with government officials involved in energy subsidy policies revealed that these policies aim to reduce the economic burden on households, especially those with low incomes. In this interview, several officials acknowledged that this policy has been successful in providing more affordable energy access; however, it has also led some households to become more wasteful in their energy consumption.

For example, an official from the Ministry of Energy and Mineral Resources stated that energy subsidies cause households to feel the need to save energy use because energy prices become more affordable. This is evident from the findings, which show that households with energy subsidies experienced a significant increase in energy consumption compared to those that did not receive subsidies.

In the interview, there was also an acknowledgment that the distribution of energy subsidies is often not on target. Some wealthier households still receive subsidies, while poorer households and those in need do not. An official from the finance ministry added that while energy subsidies are a good instrument for supporting energy access, this policy must be accompanied by a more effective mechanism for distributing aid so that no household is left behind or mistargeted.

Overall, these interviews demonstrate that while energy subsidies offer benefits in terms of reducing economic burdens, their impact on household energy consumption behavior requires monitoring, particularly when not accompanied by awareness of energy efficiency.

A questionnaire administered to 100 employees in the energy sector revealed that while they recognize the importance of energy efficiency, they also acknowledge that energy subsidy policies make many households less concerned about energy savings. The results of the questionnaire showed that the majority of employees (70%) agreed that energy subsidies increase household energy consumption. Still, only 40% felt that this policy changed their behavior to be more economical.

This indicates a gap between knowledge and action. Although employees in the energy sector have a better understanding of energy efficiency, many households tend to overlook the principle when they receive energy subsidies. This data supports previous findings that energy subsidies can lead to energy waste, especially when affordable price incentives are not balanced with adequate education on efficient energy use.

However, around 60% of respondents believed that energy subsidies should be maintained due to their social benefits, although they acknowledged that there is room for improvement in terms of more targeted distribution of subsidies. This indicates that there are diverse views on energy subsidy policies, with one hand supporting subsidies as a means to improve energy access. At the same time, the other acknowledges the potential waste caused by such policies.

Direct observation of household energy consumption patterns reveals some critical findings. Households that receive energy subsidies show higher consumption patterns compared to households that do not receive subsidies. In urban areas, households tend to use more energy because they believe that energy subsidies enable them to access energy more easily and at a lower price. These households often use larger amounts of energy for household purposes such as lighting, air conditioning, and the use of other electronic devices.

On the other hand, households in rural areas tend to be more energy efficient, although they also receive subsidies. This can be explained by limited access to electronic devices and more efficient energy infrastructure in rural areas. However, they are more dependent on LPG gas, which the government also subsidizes. In this observation, it was found that despite subsidies, rural households are more likely to regulate their energy use more carefully, especially since they do not have as easy access to energy-efficient technologies as urban households.

Additionally, some households reported a lack of knowledge or information on energy-saving methods, despite receiving subsidies. This highlights the need for improved education programs within the community, enabling them to utilize energy subsidies sustainably and effectively.

This research aligns with the findings of previous studies, such as those conducted by Sugiartiningsih (2019), which demonstrate that energy subsidies have a significant impact on household consumption. However, this study expands on these findings by adding social and economic dimensions to the discussion of energy consumption. For example, Agustin et al. (2020) found that electricity tariff policies can affect energy consumption patterns; however, they do not carefully measure how the distribution of subsidies can create inequality in energy consumption.

The study also confirms that while energy subsidies aim to help poor households, they are often not on target and risk energy waste. This finding aligns with research by Yusuf et al. (2021), which emphasizes the importance of adjusting subsidy policies to be more targeted and avoid imbalances in energy distribution.

Based on the results of this study, several practical implications can be drawn to inform the improvement of energy subsidy policies in the future. First, the government needs to re-evaluate the energy subsidy policy to ensure that this subsidy reaches households in need. One way to remedy this is to introduce a more transparent and data-driven subsidy distribution system, which can identify the households most in need of assistance.

Second, the government needs to integrate education programs on energy efficiency along with energy subsidy policies. The program can include counseling for households on how to use energy more efficiently and reduce energy waste. Additionally, incentives for the use of renewable energy sources, such as solar panels or energy saving devices, should be introduced to encourage the transition to more environmentally friendly energy options.

Third, energy subsidy policies must be more synergistic with policies that support long-term energy sustainability. This policy should incorporate energy efficiency technologies and promote the transition to renewable energy, thereby reducing dependence on fossil energy resources.

While this study offers valuable insights into the impact of energy subsidy policies, several limitations should be considered. First, this study only included households that received energy subsidies, excluding those that were not reached by this policy. Second, the data obtained from interviews and questionnaires may be influenced by respondents' biases, particularly in their perception of energy subsidy policies. Respondents may be more likely to provide more positive answers related to energy subsidies because they perceive direct benefits from these policies.

Third, this study only covers urban and rural areas in several provinces in Indonesia, and therefore, its findings cannot be generalized to all regions of Indonesia. Variations in infrastructure and access to energy in certain areas may influence the study's findings.

Overall, although this study has limitations, the results obtained still make a significant contribution in understanding the impact of energy subsidy policies on household consumption patterns in Indonesia.

4. CONCLUSION

This study aims to analyze the impact of energy subsidy policies on household consumption patterns in Indonesia. Based on the results of interviews, questionnaires, and observations conducted on households that received energy subsidies, it was found that the energy subsidy policy has a significant influence on household energy consumption patterns. Households that receive energy subsidies tend to consume more energy compared to households that do not receive subsidies. This suggests that energy subsidies can lead to energy waste, especially when subsidized energy prices are more affordable and reduce incentives to use energy efficiently.

Energy subsidy policies, while aimed at reducing the spending burden on low income households, also present challenges related to the untargeted distribution of subsidies. Some families that do not need

subsidies still receive subsidies, while households that are more in need often cannot access them. Additionally, while energy subsidies help alleviate energy costs, their impact on household energy consumption behavior needs to be closely monitored, as they can lead to increased energy use without considering efficiency.

The results of this study also show that although many respondents support the sustainability of energy subsidy policies, they recognize the need for improvements in the distribution of subsidies, which should be more targeted and supported by education programs on energy efficiency. Therefore, to increase the effectiveness of energy subsidy policies, the government needs to reevaluate the subsidy distribution mechanism and incorporate energy education programs that can enhance public awareness about efficient and sustainable energy use.

Overall, this study concludes that Indonesia's energy subsidy policy needs to be improved to ensure it is more targeted and does not result in energy waste. The integration of energy efficiency technologies and the transition to renewable energy must also be part of a more sustainable long-term energy policy.

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