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Unintended Beneficiaries: Examining 3 kg LPG Consumption Among Upper-Middle-Class Households in Bali

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ABSTRACT

Research Originality: This study investigates the consumption patterns and awareness of 3 kg LPG subsidy policies among upper-middle-class households in Bali, a relatively unexplored area in energy subsidies and consumer behavior.

Research Objectives: To examine the effects of income, price, and practicality on awareness and consumption of 3 kg LPG and evaluate whether awareness mediates these relationships.

Research Methods: A mixed-methods approach combines quantitative survey data with qualitative interview insights. Structural Equation Modeling (SEM) analyzes quantitative relationships, while qualitative findings provide contextual depth.

Empirical Results: Income does not affect awareness, while price and practicality had a significant positive impact. However, income, price, and practicality had adverse but insignificant effects on 3 kg LPG consumption. Awareness did not mediate the relationships between income, price, practicality, and consumption.

Implications: Policymakers should improve subsidy distribution, strengthen public education campaigns, and promote alternatives like induction stoves to reduce dependence on subsidized LPG.

Keywords:
consumer behavior; energy policy; upper-middle-class households

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INTRODUCTION

Energy subsidies are crucial in supporting low-income households in Indonesia, particularly in meeting their daily cooking needs. The subsidized 3 kg LPG has become a vital energy source, replacing more polluting fuels such as kerosene and firewood (Fernandes, 2018). The Indonesian government's 3 kg LPG subsidy program aims to alleviate the economic burden on low-income households and promote the use of cleaner energy. However, a concerning trend has emerged in recent years: increasing subsidized 3 kg LPG consumption by upper-middle-class households, who are not the intended beneficiaries. This phenomenon raises concerns because it can reduce the effectiveness of the subsidy program, cause supply shortages for people experiencing poverty, and increase the government's fiscal burden. This research is important to understand the consumption patterns and factors driving upper-middle-class households to use subsidized LPG and to evaluate their awareness of the subsidy policy.

The consumption of Liquefied Petroleum Gas (LPG) has been extensively studied in the framework of its economic, environmental, and technological implications. Previous research highlights the economic impact of LPG, such as its positive correlation with economic growth in regions like Saudi Arabia and BRICS-T countries, alongside its role in reducing energy costs and promoting sustainability through targeted price policies (Daly et al., 2024; Mohamad Taghvaee et al., 2023; Tekin & Dirir, 2024). Additionally, LPG is recognized for its environmental benefits, including reduced emissions compared to traditional fuels, making it a cleaner and more sustainable energy source, particularly for urban areas and developing countries (H. Liu et al., 2022; Warguła et al., 2020).

Technological advancements further enhance LPG's efficiency and adoption. Research highlights improved appliances, vehicle modifications, and optimized production processes as drivers of increased LPG usage across diverse applications, including automotive and household energy needs (Ali et al., 2021; Synák et al., 2019). Income levels and socioeconomic factors also significantly influence LPG adoption, with higher incomes enabling transitions from traditional biomass fuels to cleaner options like LPG, particularly in rural areas (Bazgir et al., 2024). Various studies have highlighted the factors affecting LPG consumption, including price, income, and urbanization. Sapnken et al. (2020) and Dalaba et al. (2018) found that price, income, and urbanization significantly impact LPG consumption in the short and long term, with evidence of fuel substitution from kerosene to LPG. Puzzolo et al. (2019) and Alzyadat (2022) affirm that subsidized prices increase LPG usage. Kalli et al. (2022) and Xu et al. (2019) add that higher food and LPG prices can reduce food security and LPG consumption, presenting challenges in achieving the Sustainable Development Goals (SDGs).

Other studies have analyzed the impact of price differences between the public and private sectors on LPG consumption. Alefan et al. (2018), Štimac et al. (2023), and Zemenkov et al. (2017) found that LPG prices in the private sector are higher than in the public sector, affecting affordability and consumption patterns. Kim (2024) and Kamugisha et al. (2019) emphasize the importance of considering standard prices

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for LPG, gasoline, and diesel, along with annual fuel consumption and price growth rates, in the economic feasibility analysis of LPG consumption. Market dynamics also influence LPG prices. Gonzalez and Lagos (2021) found that the presence of natural gas providers can reduce retail LPG prices. Moreover, appeals have been shown to increase the willingness to pay for unsubsidized LPG and encourage actual consumption (Tang, 2024; Zahno et al., 2020).

Other research also shows that personal income levels significantly influence LPG consumption patterns. Kumar et al. (2020) found a positive correlation between household income and the adoption and sustainable use of LPG. Parikh et al. (2019) emphasized that higher income levels are associated with increased spending on LPG as a substitute for traditional fuels such as wood. Kizilcec et al. (2022) highlight the crucial role of household income and education in the adoption and sustainable use of LPG. The portability of LPG also influences consumption patterns. Angoori and Kumar (2023) showed that the availability and easy distribution of LPG, especially in urban and suburban areas, and the potential accessibility in rural areas after the supply chain is established are the main drivers of increased LPG consumption. Pollard et al. (2018) and Liu et al. (2023) added that introducing smaller LPG cylinders, such as 5 kg, increases portability and reduces upfront costs for low-income households, potentially increasing LPG usage.

Awareness and knowledge of subsidy policies also play a significant role in influencing LPG consumption patterns. Lestarianingsih and Adrison (2021) showed that higher education levels can increase awareness of LPG subsidies among poor households. Government initiatives such as the Direct Benefit Transfer for LPG (DBT-PAHAL) in India demonstrate the impact of policy awareness on consumption behavior (Jagadale & Kemper, 2022). Various researchers with diverse focuses have conducted other research on LPG usage. Almaya et al. (2021) examined the influence of world oil prices, inflation, and household consumption on Indonesia's economic growth, finding that fluctuations in world oil prices affect people's purchasing power for LPG. Mulyana et al. (2023) reviewed business development strategies for 3 kg LPG distributors in Cirebon, showing that supply availability greatly determines consumption patterns. Carrión et al. (2021), in their study on LPG adoption in Ghana, found that relevant intervention programs can enhance sustainable LPG usage. Aryani and Rachmawati (2019) examined the poverty typology in Palembang, highlighting the role of subsidized energy in the lives of poor households. Nduka et al. (2020) studied the impact of a pay-as-you-go LPG system in Nigeria, highlighting the importance of payment mechanisms in LPG adoption.

Meanwhile, Hu et al. (2019) and Sapnken et al. (2023) examined urban household energy consumption, showing that income and economic stability significantly influence fuel choices. Abdulai et al. (2018) reviewed the mass distribution of LPG stoves in Ghana, showing that public knowledge and awareness of subsidies greatly determine adoption levels. Das & Pal (2019), in their study on energy choices of poor households in India, found that price and awareness are critical factors in LPG usage. Thoday et al. (2018) discussed Indonesia's mass conversion program from kerosene to LPG, highlighting lessons and recommendations for expanding clean energy. Fernandes (2018) studied consumer

knowledge about subsidized LPG in Indonesia, showing that many consumers are unaware of the subsidy allocation.

Despite extensive research, several gaps remain unanswered. One of the main gaps is the lack of understanding of the specific factors driving upper-middle-class households to use subsidized LPG. Almaya et al. (2021) and Mulyana et al. (2023) focused more on macroeconomic and distribution aspects without delving into individual or household motivations for LPG usage. Carrión et al. (2021) and Nduka et al. (2020) focused on policy interventions without deeply examining upper-middle-class consumer behavior. Hu et al. (2019) and Abdulai et al. (2018) reviewed economic factors in general but did not explore the role of awareness and knowledge of subsidy policies in usage decisions. Das and Pal (2019) and Fernandes (2018) identified the importance of consumer knowledge but did not explain in detail how this level of awareness interacts with economic and social factors. Thoday et al. (2018) and Stanistreet et al. (2019) focused more on policy and implementation in general without touching on the specific behavior of upper-middle-class households.

The novelty of this study lies in its holistic approach to understanding 3 kg LPG consumption by upper-middle-class households in Bali. This study not only focuses on economic factors such as income and price but also examines convenience and the role of awareness and knowledge regarding subsidy policies. This approach has not been widely explored in previous studies focusing on one aspect. By combining quantitative and qualitative analyses, this research offers a more comprehensive and in-depth view of consumer motivations and behavior, which is expected to serve as a foundation for more effective and equitable energy subsidy distribution policies.

This study aims to identify the factors influencing the consumption of 3 kg LPG by upper-middle-class households in Bali. Specifically, this research will analyze the impact of household income, market LPG prices, and convenience on consumption levels and the role of awareness and knowledge of subsidy policies as intervening variables. Through this approach, it is hoped to gain a more comprehensive understanding of the motivations and behaviors of upper-middle-class households in using subsidized LPG. This study is expected to contribute significantly to economics and public policy. Theoretically, this research will enrich the literature on consumer energy behavior, especially in the context of government subsidy programs. The findings from this study can provide new insights into the interaction between economic factors and policy awareness in determining household energy consumption patterns. Practically, the results of this research can be used as a basis for the government to formulate more effective policies in targeting energy subsidies and to develop educational programs that increase public awareness about the allocation of subsidies.

METHOD

This study employed a mixed-methods approach integrating quantitative and qualitative methods. This approach was chosen to provide a more comprehensive and

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in-depth understanding of the phenomenon under study, which cannot be achieved using a single method alone. The independent variables in this research include income, price, and practicality, with awareness as the intervening variable and consumption level of 3 kg LPG as the dependent variable. The research was conducted in Bali Province, Indonesia, targeting middle-to-upper-income households using 3 kg LPG. The sampling technique used was purposive sampling. This technique was chosen as the study focused on households with specific characteristics relevant to the research objectives. The quantitative sample size was 100 respondents, based on a total population of 198,000 households.

The quantitative respondents were selected based on the following criteria: (1) having a minimum monthly household income of IDR 2,700,000, categorized as middle-to-upper income in Bali, and (2) actively using 3 kg LPG for household activities. These criteria were designed to ensure that the sample accurately represents the target population. For the qualitative approach, ten respondents were selected using purposive sampling with the same criteria: middle-to-upper income households actively using 3 kg LPG. Quantitative data collection was conducted through surveys using closed-ended Likert-scale questionnaires to measure respondents' perceptions of the research variables. On the other hand, qualitative data were obtained through in-depth interviews using semi-structured interview guidelines. This approach allowed the study to produce robust statistical analysis from quantitative data while offering richer contextual insights from qualitative data.

The data analysis technique used was Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM is a variance-based multivariate analysis technique widely employed to examine complex relationships among latent variables. This technique is particularly advantageous for predictive purposes, especially in studies involving theoretical models with multiple reflective or formative constructs (Hair & Alamer, 2022; Kono & Sato, 2023). PLS-SEM is highly flexible in handling non-normal data distributions and requires a smaller sample size than Covariance-Based SEM (CB-SEM), making it highly suitable for exploratory research or studies with sample size limitations (Cheah et al., 2024). Furthermore, PLS-SEM excels in predictive accuracy and dynamically identifies mediation and moderation effects (Ringle et al., 2014).

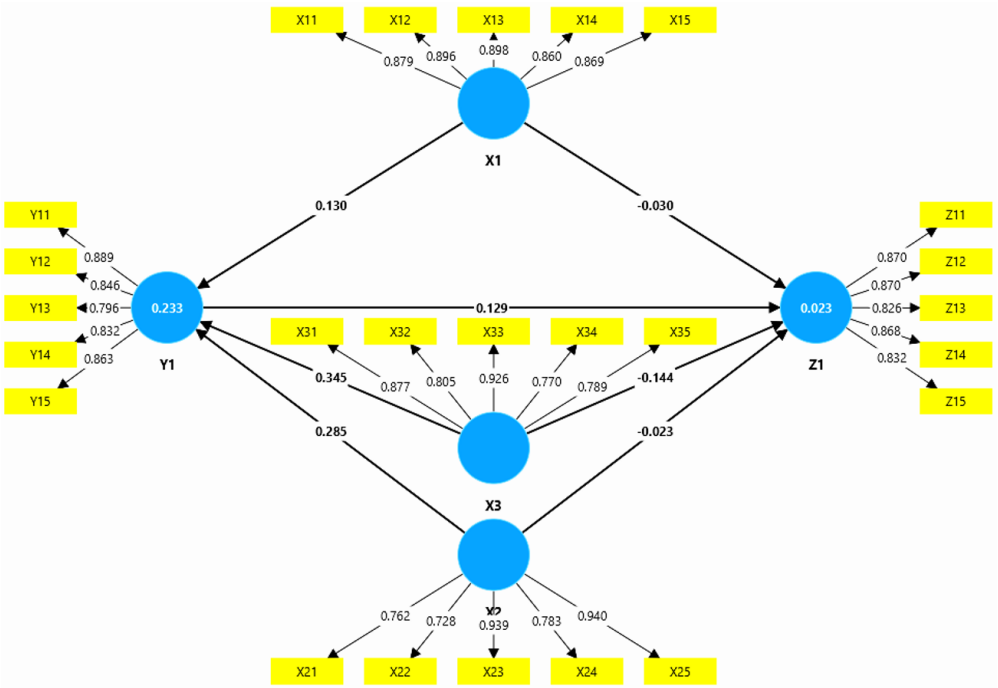
The PLS-SEM analysis process began with formulating the research model, including the specification of relationships between latent variables (unmeasured directly) and manifest variables (directly measured). The outer model illustrates the relationships between latent variables and their indicators. In contrast, the inner model describes the relationships among latent variables, whether independent, intervening, or dependent. Data collected through questionnaires were first tested for validity and reliability and cleaned of missing values and outliers. The measurement model evaluation ensured the constructs' validity and reliability. Convergent validity was assessed through loading factor values and Average Variance Extracted, while discriminant validity was tested using the Fornell-Larcker criterion (AVE should be greater than inter-variable correlations) or HTMT analysis. Reliability was examined through Composite Reliability and Cronbach's Alpha.

The structural model evaluation included testing the R^2 values, where an R^2 of approximately 0.67 is considered strong, 0.33 moderate, and 0.19 weak. Path coefficients were tested using bootstrapping techniques to determine statistical significance (t-statistics > 1.96 and $p < 0.05$). Additionally, mediation analysis was conducted to identify the role of the intervening variable. The results of these analyses were interpreted to understand significant relationships, model strength, and predictive relevance. These findings were then summarized in conclusions, encompassing the theoretical and practical implications of the research. This step ensured that the PLS-SEM analysis was performed accurately, reliably, and transparently (Al-Emran et al., 2019; Hair & Alamer, 2022; Sarstedt & Moisescu, 2024).

RESULT AND DISCUSSION

The measurement model analysis in this study uses Smart PLS 4 to evaluate the convergent validity of the indicators for each variable. Convergent validity refers to the extent to which indicators designed to measure a construct measure that construct. Based on the analysis results, all indicators used in this study have outer loading values greater than 0.70. These high outer loading values indicate that each indicator has a strong and consistent correlation with the construct it measures. Figure 1 below shows the results of the outer loading analysis for each construct.

Figure 1. Outer Loading Analysis Results for Each Construct



The outer loading analysis results indicate that all indicators used in this study have good convergent validity. This means that each indicator accurately measures the intended construct. Thus, the measurement model used in this study can be considered

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valid and reliable. Meanwhile, construct reliability and validity are evaluated to ensure that the measurement instruments used in this study are reliable and valid. This evaluation includes statistical indicators such as Cronbach's Alpha, Composite Reliability, and Average Variance Extracted (AVE). The results obtained show that all constructs have excellent reliability and validity. Table 1 presents the reliability and validity values of the constructs.

Cronbach's Alpha values for all constructs are above 0.90, indicating a very high level of internal consistency. This means that all indicators used to measure the constructs provide consistent and reliable results. The Composite Reliability values also show excellent results, with all constructs having values above 0.90. Composite Reliability provides a better picture of construct reliability than Cronbach's Alpha as it considers the factor loadings of each indicator. These results indicate that the constructs measured in this study are reliable. The Average Variance Extracted (AVE) for all constructs also shows satisfactory results with values above 0.50. This indicates that the constructs have good convergent validity, meaning they can capture a significant amount of variance from their indicators compared to the variance caused by measurement error. Overall, the measurement instruments used in this study are reliable and valid. Therefore, the measurement model can be trusted to measure the studied constructs and provide a solid foundation for further analysis.

Table 1. Reliability and Validity Values of the Constructs

Variable	Cronbach's Alpha	Composite Reliability (Rho_A)	Composite Reliability (Rho_C)	Average Variance Extracted (AVE)
X1	0,928	0,948	0,945	0,776
X2	0,909	1,158	0,919	0,698
X3	0,908	1,078	0,920	0,698
Y1	0,901	0,914	0,926	0,715
Z1	0,911	0,984	0,931	0,729

Source: PLS-SEM Algorithm Test Result, 2024

Discriminant validity measures the extent to which constructs that should not correlate with each other are truly uncorrelated. Two measures used to test discriminant validity are the Heterotrait-Monotrait Ratio (HTMT) and the Fornell-Larcker Criterion. The HTMT results show that all values are below 0.85, indicating that the constructs in this study have good discriminant validity. HTMT measures the relationships between different constructs, and these results show that the constructs are indeed distinct from each other, as proposed by the theory. The Fornell-Larcker Criterion also indicates that each construct has a higher square root AVE than the inter-construct correlations. This means that the variance captured by the construct is more significant than that captured by other constructs. In other words, the constructs have good discriminant validity, indicating that each construct is unique and does not overlap with different constructs. Table 2 presents the results of the discriminant validity analysis.

Table 2. Discriminant Validity Analysis Results

Variable	Heterotrait-Monotrait Ratio (HTMT)	Fornell-Larcker Criterion
X2 <-> X1	0,059	-0,028
X3 <-> X1	0,110	0,080
X3 <-> X2	0,114	0,058
Y1 <-> X1	0,161	0,149
Y1 <-> X2	0,239	0,301
Y1 <-> X3	0,301	0,372
Z1 <-> X1	0,111	-0,021
Z1 <-> X2	0,065	0,008
Z1 <-> X3	0,117	-0,100
Z1 <-> Y1	0,096	0,064

Source: PLS-SEM Algorithm Test Result, 2024

These two measures collectively provide strong evidence that the constructs measured in this study are discriminantly valid. Good discriminant validity ensures that the results obtained from data analysis can be trusted and support the overall validity of the research model. The quality evaluation of the model in this study is conducted by examining the R-square criteria. R-square measures the proportion of variance in the dependent variable that the independent variables in the model can explain. R-square adjusted provides an adjustment to the R-square for the number of predictors in the model and the sample used. Table 3 presents the R-square and R-square adjusted values.

Table 3. R-square and R-square Adjusted Values

Variable	R-square	R-square Adjusted
Y1	0,233	0,209
Z1	0,023	-0,018

Source: PLS-SEM Algorithm Test Result, 2024

The R-square results show that all the variables collectively explain 23.3% of the variance in awareness (Y1), indicating a moderate predictive power of the model. However, for variable consumption level (Z1), the model only explains 2.3% of the variance, showing shallow predictive power. The adjusted R-square value for awareness (Y1) is 0.209, slightly lower than the R-square, indicating adjustment for the number of predictors in the model. Meanwhile, the adjusted R-square for consumption level (Z1) is -0.018, indicating that the model does not have significant predictive power after adjustment. Path coefficients in the structural model indicate the strength and direction of relationships between latent variables. P-values are used to test the statistical significance of these relationships. Figure 2 presents the path coefficients and p-values results.

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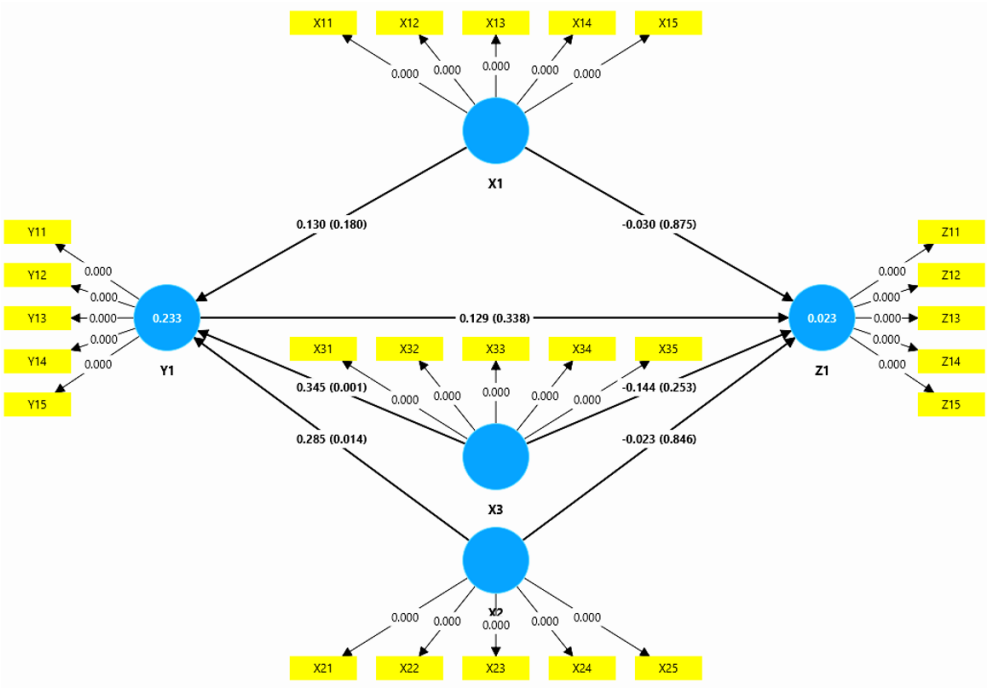
Figure 2. Path Coefficients and P-Value Results



The relationship between price and awareness and between practicality and awareness is statistically significant, indicating that these two variables have a positive effect on awareness. Conversely, although vivacious, the relationship between income and awareness is insignificant, indicating that income does not have a strong enough effect on awareness. For variable consumption level, no significant relationships were found. The relationships between income, price, practicality, and awareness with consumption level are all insignificant. This result indicates that these variables do not directly impact this study's consumption level. The total indirect effects analysis results show no indirect effects of income, price, and practicality on consumption level through awareness. Thematic analysis and coding techniques were employed to identify themes and patterns in the interview transcripts, resulting in several key findings regarding the respondents' perceptions, preferences, and consumption habits of 3 kg LPG gas. Most respondents stated that their primary reason for using 3 kg LPG gas was its practicality and ease of use. Respondents appreciated the small size of the 3 kg LPG cylinder, which is easy to lift and move.

Price emerged as a significant theme in the interviews. Although the respondents are from middle-to-upper-income households, they still consider price in their consumption decisions. Some respondents showed a high awareness of the 3 kg LPG subsidy policy. They understand that the 3 kg LPG cylinders are subsidized by the government and intended for low-income households. However, this awareness does not always stop them from using the subsidized cylinders. Respondents also revealed that personal habits and preferences significantly influence their decision to use 3 kg LPG. Some respondents have been using 3 kg LPG for a long time and feel comfortable with it. This preference is often

maintained even when other alternatives are available, indicating that established habits are challenging to change. The distribution and availability of 3 kg LPG also emerged as important factors in the interviews. Some respondents noted that 3 kg LPG cylinders are more easily found and widely distributed in their area. This wide availability makes 3 kg LPG more accessible for middle-to-upper-income households.

Some respondents highlighted the moral and ethical aspects of using 3 kg LPG. Despite recognizing the economic benefits of using subsidized gas, some respondents feel guilty about using subsidies intended for people experiencing poverty. This sentiment indicates a moral dilemma among users. Respondents also mentioned that social influence and the surrounding environment affect their decisions. Some respondents admitted to following the example of neighbors or friends who also use 3 kg LPG. This condition shows that consumption decisions are also influenced by social environment and local norms.

Based on quantitative analysis, the first finding of this study reveals that income has a positive but statistically insignificant influence on awareness of the 3 kg LPG subsidy policy. While income tends to increase awareness of the subsidy policy, its effect is not strong or consistent enough to be deemed statistically significant. Theoretically, Keynesian Consumption Theory posits that higher-income individuals have better economic capacity to access information or engage in public issues, including subsidy policies (Kates, 2014). However, in the case of 3 kg LPG, these results suggest that awareness of subsidies is not solely dependent on income level but is more influenced by other factors, such as price, access to information, or specific household energy needs. Another explanatory factor is the Rational Ignorance Theory, which posits that higher-income individuals may deprioritize information about subsidy policies because the direct impact of subsidies on their expenditures is relatively tiny (Somin, 2019). Conversely, subsidies play a critical role in meeting daily needs for lower-income groups, making them more aware of such policies. In this context, higher incomes may reduce the urgency to understand or pay attention to subsidy policies as the contribution of subsidies to overall expenditures is perceived as insignificant.

Previous studies have shown that higher income generally correlates positively with adopting LPG as an energy source, as households with higher incomes are more likely to transition from traditional fuels to cleaner and more efficient LPG. Ishengoma and Igangula (2021) and Pallegedara et al. (2021) demonstrated that higher-income households are more likely to adopt LPG than lower-income households, owing to their greater capacity to purchase clean energy. However, in the context of subsidized 3 kg LPG, the effect of income on subsidy awareness may differ due to factors such as limited access to information or alternative energy preferences.

This phenomenon also relates to energy stacking, wherein higher-income households continue using traditional and modern energy sources despite having access to LPG, as Alananga (2024) noted. This indicates that income growth does not always correlate with increased awareness of subsidy policies, as higher-income groups tend to use LPG

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as one of several energy options rather than a primary necessity. Other factors, such as awareness of the health and environmental benefits of LPG, also play a significant role. Dewoolkar et al. (2020) emphasized that households aware of the negative health impacts of traditional fuels are more likely to adopt LPG. However, misinformation and lack of trust in subsidy policies may hinder LPG adoption despite economic incentives. Calvo-Gonzalez et al. (2017) found that mistrust of LPG subsidy reforms reduced early adoption in El Salvador until more accurate information became available. These findings resonate with the reality in Indonesia, where limited government communication regarding the 3 kg LPG subsidy policy may affect public awareness, particularly among higher-income groups who may perceive the policy as less relevant to them.

Although higher incomes enable households to utilize the 3 kg LPG subsidy, they do not necessarily increase policy awareness. This underscores the need for targeted education and awareness campaigns, as Swain and Mishra (2021) and Gill-Wiehl et al. (2022) suggested. Campaigns emphasizing health benefits, cost savings, and environmental support can enhance awareness, even among groups not directly dependent on the subsidy. Furthermore, accessibility and distribution of LPG are critical factors supporting adoption and awareness, as highlighted by Swain and Mishra (2020). These findings align with previous literature indicating that while income influences LPG adoption, it is not always the primary determinant of subsidy policy awareness. Therefore, effective policy strategies should integrate improved distribution approaches, strong public communication, and educational campaigns targeting middle-income groups to enhance awareness of the 3 kg LPG subsidy policy.

The second finding of this study reveals that price has a positive and significant influence on awareness of the 3 kg LPG subsidy policy. Compared to unsubsidized alternatives or larger cylinders, the low price of 3 kg LPG becomes a striking factor that attracts consumer attention, including middle-income households. This price difference encourages consumers to choose 3 kg LPG and raises awareness that the government subsidizes this product. In other words, low prices are a key element influencing purchasing decisions and enhancing public awareness of the underlying subsidy policy. Price is an economic tool and an effective informational instrument in communicating public policies. This finding aligns with the Price Signaling Theory (Debo et al., 2020; Grigoriou et al., 2016), which explains that price can serve as an informational signal to consumers, mainly when there is an information asymmetry between consumers and producers. The low price of 3 kg LPG signals that the government subsidizes the product, creating awareness of the subsidy policy. This is also supported by Consumer Behavior Theory (Foxall, 2015; Taheran et al., 2024), which emphasizes that price is a central element influencing consumer perceptions and awareness of a product or policy. In this case, the price difference between subsidized 3 kg LPG and unsubsidized LPG provides a direct stimulus for consumers to recognize that they benefit from government intervention.

The relationship between the price of 3 kg LPG and public awareness of the subsidy policy reflects a complex interplay of factors, such as supply chain management, economic accessibility, and public awareness levels. The findings indicate that the affordable price

of 3 kg LPG can effectively enhance public awareness of the subsidy policy. However, the study also highlights challenges in implementing the subsidy policy, particularly regarding distribution and supply availability. Previous studies by Sulistio et al. (2016) and Meutia and Anshar (2021) revealed that inefficient supply chain management often leads to scarcity and price surges for 3 kg LPG, especially outside Java Island. This results in consumer-level prices exceeding the government-mandated retail ceiling price, undermining the subsidy policy's effectiveness in raising public awareness. In contrast, this study indicates that maintaining price stability sustains public awareness of the subsidy.

From an economic accessibility perspective, previous research by Jeuland et al. (2023) and Swain and Mishra (2020) demonstrated that subsidies significantly improve LPG affordability for low-income households. These findings align with this study, where low prices act as an economic incentive that fosters both awareness and usage of LPG, even among households not primarily targeted by the subsidy. However, Dewanjaya et al. (2022) highlighted that price reductions alone are insufficient if distribution issues remain unresolved, underscoring a gap in the current subsidy policy.

In terms of public awareness, this study found that public awareness of the 3 kg LPG subsidy policy is generally high. This finding is consistent with Woolley et al. (2022), who noted that awareness levels increase with targeted communication campaigns. However, awareness alone cannot drive LPG adoption without addressing economic and logistical barriers. Patil et al. (2021) added that public education campaigns on the health and environmental benefits of LPG could potentially enhance awareness and LPG adoption. These findings underscore the importance of integrating effective price signaling with robust communication efforts to strengthen the success of subsidy policies.

The policy implications drawn from this study suggest the need for an integrated approach encompassing reliable supply chain management, adequate subsidy levels to ensure affordability and comprehensive public awareness campaigns. This supports the views of Sulistio et al. (2016) and Troncoso & Soares da Silva (2017), who emphasized that regionally targeted subsidies and consistent supply distribution can improve overall policy effectiveness. This study reaffirms that price is a primary factor in increasing public awareness of the 3 kg LPG subsidy policy. However, a synergy between price stability, distribution efficiency, and public education is essential for holistic policy success.

The third finding of this study reveals that the practicality of using 3 kg LPG has a positive and significant effect on public awareness of the 3 kg LPG subsidy policy. This indicates that the functional aspects of a product play a crucial role in shaping consumer awareness of public policies. The practicality of a product, such as ease of transportation, size suitability for household needs, and user-friendliness in daily activities, increases the likelihood of individuals paying attention to information related to policies governing the product. The accessibility and ease of use of 3 kg LPG encourage consumers to understand the subsidy policy better, including identifying the intended target beneficiaries. Moreover, practicality often enhances consumer engagement with the product, ultimately creating opportunities to receive or seek additional information about related aspects, such as

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subsidy objectives and eligibility requirements. This finding underscores practicality influences consumption preferences and increases awareness of the underlying policy. Therefore, energy subsidy policies should consider practicality factors in their design and implementation to ensure better effectiveness and awareness among the public.

In consumer behavior theory, practicality is one of the utilitarian attributes influencing consumer decisions and engagement (McFadden, 2024; Sheth, 2021; Wood et al., 2022). Practicality, such as the small and portable size of cylinders and their ease of use for daily cooking, fosters a closer relationship between consumers and the product. This connection enables consumers to be more exposed to information about the product, including policies regulating it, such as the LPG subsidy. This finding is also consistent with brand exposure theory, which states that the more frequently a product is used or seen, the more likely consumers are to notice and understand information related to the product (Kwon & Shin, 2020; Zeqiri et al., 2024). The practicality of 3 kg LPG increases usage frequency, thereby enhancing the likelihood of consumers understanding the subsidy policy associated with the product.

The small and accessible size of the cylinders is designed to meet the needs of low-income households and small businesses, making them easier for these groups to purchase and use (Arifin, 2021; Sulistio et al., 2016). However, the effectiveness of this practicality is often hindered by distribution challenges. Previous studies have shown that inefficient distribution systems lead to shortages and price increases, particularly in regions outside Java, reducing their availability for the intended beneficiaries (Dewanjaya et al., 2022; Meutia & Anshar, 2021). Furthermore, fraudulent practices, such as purchases by higher-income individuals, exacerbate this problem and limit accessibility for low-income communities (Arifin, 2021). Public awareness of subsidy policies is crucial to ensuring the effectiveness of such programs. However, low enforcement levels and insufficient outreach efforts result in many consumers not fully understanding the purpose of these subsidies. Additionally, the significant fiscal burden of LPG subsidies underscores the importance of ensuring that subsidies are well-targeted to reduce budget inefficiencies (Aziz et al., 2024; Hakam et al., 2022).

Alternative solutions, such as transitioning from LPG to induction stoves, have also been proposed to reduce reliance on subsidized LPG by leveraging excess electricity capacity from new power plants (al Irsyad et al., 2022; Hakam et al., 2022). Thus, this study supports the notion that the practicality of 3 kg LPG can increase awareness of the subsidy policy. However, this must be complemented by better distribution mechanisms and broader educational efforts to ensure that subsidy benefits reach the appropriate recipients.

The fourth finding reveals that income has a negative and insignificant influence on the consumption of 3 kg LPG by upper-middle-class households in Bali. This indicates that income is not a primary determinant in the decision-making process of upper-middle-class households to use subsidized 3 kg LPG. According to consumption theory, such as the Theory of Consumer Choice (Thaler, 2019), purchasing decisions are typically influenced

by income, with higher income levels generally prompting consumers to shift towards higher-quality or more exclusive goods and services. However, in this study, the results contradict the theory's predictions. One possible explanation is that the consumption of 3 kg LPG by upper-middle-class households is not driven by economic necessity but by practicality and habit. Habitual behavior theory (Pollard, 2015) explains that long-standing habits often influence consumption decisions, regardless of economic factors such as income. Upper-middle-class households may use 3 kg LPG due to familiarity or comfort with its size and usage rather than economic constraints.

Additionally, these findings are supported by previous research indicating that higher-income groups often disregard subsidy compliance due to a lack of awareness about regulations or the ease of accessing subsidized goods (Das & Pal, 2019; Fernandes, 2018). Furthermore, Prospect Theory (van Bilsen & Laeven, 2020) provides another perspective, suggesting that these groups may view 3 kg LPG as a safe and practical choice, regardless of their economic status. These findings underscore the importance of considering non-economic factors, such as habit and practicality, in understanding the consumption behavior of 3 kg LPG among upper-middle-class households. This also highlights the need for the government to emphasize education and stricter oversight of energy subsidy policies to ensure better targeting.

The findings deviate from the predictions of the energy ladder hypothesis (Ishengoma & Igangula, 2021; Sapnken et al., 2020), which posits that higher income levels drive a transition to cleaner and more efficient energy sources, such as LPG. Upper-middle-class households are expected to transition to non-subsidized LPG or alternative energy sources. However, this study found that they continue to use 3 kg LPG, which is intended explicitly for low-income groups. Previous studies have also noted a positive relationship between income and LPG consumption. Yawale et al. (2021) and Baul et al. (2018) show that higher income enables households to transition from biomass to LPG. However, this study finds that the consumption of 3 kg LPG by upper-middle-class households in Bali is more influenced by non-economic factors, such as habit and practicality, rather than income. This is supported by Arifin (2021) and Sulistio et al. (2016), who note that subsidized LPG distribution is often ineffective, allowing easy access for non-target households regardless of income level.

Moreover, price sensitivity also plays an important role. A study in Rwanda by Witinok-Huber et al. (2024) found that higher-income households are more responsive to changes in LPG prices, while lower-income households rely more on subsidies. In Bali, these findings may reflect that upper-middle-class households continue using 3 kg LPG not because of economic constraints but due to accessibility and practicality. This study's findings indicate that the relationship between income and 3 kg LPG consumption by upper-middle-class households does not align with general assumptions in energy transition theory. This reinforces the importance of prioritizing distribution monitoring and ensuring that subsidy policies are well-targeted, as suggested by Dewanjaya et al. (2022) and Hakam et al. (2022).

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The fifth finding of this study indicates that price has a negative but insignificant influence on the consumption of 3 kg LPG by upper-middle-class households in Bali. This suggests that the decision of upper-middle-class households to use subsidized 3 kg LPG is not significantly affected by price fluctuations. In classical economic theory, price is often considered a primary factor influencing consumption decisions through the mechanisms of supply and demand (Kates, 2014; Migunov & Syutkina, 2024). However, the findings do not fully support the theory in this case. These results can be explained by consumer behavior theory, which posits that consumer behavior is not solely determined by economic factors such as price but also by habits, social norms, and ease of access. Upper-middle-class households in Bali may continue using 3 kg LPG due to established habits or perceptions of its practicality and convenience, even though they have the financial capacity to switch to non-subsidized LPG or alternative energy sources.

Previous studies also provide relevant insights. Research by Dewanjaya et al. (2022) and Arifin (2021) found that poorly targeted subsidized LPG distribution can allow easy access for upper-middle-class households, thereby reducing the significance of price in influencing consumption decisions. These findings differ from earlier studies that generally identified a significant negative relationship between price and LPG consumption. For example, research in Rwanda by Witinok-Huber et al. (2024) showed that a price increase of 1 USD per kilogram reduced LPG consumption by 4.1 kg per month. Similarly, in Cameroon, mid-term price elasticity ranged between -0.330 and -0.401, indicating that higher LPG prices significantly reduced consumption (Sapnken et al., 2023). However, in Bali, the price impact on consumption was insignificant, which may be explained by other factors, such as the practicality and habitual use of 3 kg LPG outweighing price considerations. Research in Indonesia also demonstrated that subsidies for 3 kg LPG cylinders have helped maintain consumption levels despite price increases (Aziz et al., 2024). This suggests that the availability of subsidies can reduce price sensitivity among users, including upper-middle-class households.

Further research in India by Mishra et al. (2024) indicated that while subsidies increased LPG adoption, annual consumption per user tended to decline. This highlights that subsidy mechanisms and government policies can influence the effect of price on consumption. In Thailand, LPG price hikes triggered public protests, prompting the government to implement price compensation policies to maintain energy affordability (Sripokangkul, 2014). The price sensitivity of 3 kg LPG consumption among upper-middle-class households in Bali may not be as strong as in other countries due to non-economic factors such as habits, accessibility, and subsidies playing a more dominant role.

The sixth finding indicates that practicality has a negative but insignificant influence on the consumption of 3 kg LPG by upper-middle-class households in Bali. This suggests that although practicality, such as the small cylinder size, ease of transportation, and user-friendliness, is considered an important utilitarian attribute, it is not a primary determinant in consumption decisions for this group. In product utilitarianism theory, practicality is often viewed as a key factor influencing purchase decisions, particularly for everyday products like LPG (Littmann, 2016). However, in the case of upper-middle-class

households in Bali, the results indicate that practicality does not play a significant role in increasing the consumption of subsidized 3 kg LPG. These findings can be explained through the Theory of Planned Behavior (Ajzen & Schmidt, 2020). Upper-middle-class households in Bali may use 3 kg LPG more out of habit or because of easy accessibility rather than considerations of practicality.

These findings differ from previous studies that demonstrated practicality, such as small size and ease of transportation, significantly promoting LPG consumption. Quaglione et al. (2019) found that the small and lightweight cylinder size facilitates storage and transportation, making it more appealing to households requiring high flexibility. Moreover, the user-friendly design and ease of use of 3 kg LPG are often associated with consistent consumption patterns, especially in areas with limited space or infrastructure (Dewanjaya et al., 2022). However, in the case of upper-middle-class households in Bali, these findings suggest that practicality is not a primary factor driving consumption. This may be due to entrenched habits or a preference for the accessibility of 3 kg LPG supported by subsidies rather than prioritizing its practical attributes. Furthermore, upper-middle-class households likely have more energy options, such as non-subsidized LPG or other energy sources, making the practicality of 3 kg LPG less relevant compared to lower-income households.

This discrepancy can also be attributed to uneven distribution factors. Dewanjaya et al. (2022) highlighted that distribution challenges often affect perceptions of the practicality of 3 kg LPG, particularly in more remote areas. In the context of Bali, the relatively easy access of upper-middle-class households to 3 kg LPG may reduce their reliance on practicality as a factor in consumption decisions. These findings underscore that while practicality theoretically enhances consumption, it is not universally applicable and can be influenced by socioeconomic contexts and the dynamics of prevailing subsidy policies. The implications of these findings point to the need for policy approaches that consider more complex consumption motivations, particularly among upper-middle-class households.

The seventh finding of this study reveals that awareness of subsidy policies has a positive but insignificant effect on the consumption of 3 kg LPG by upper-middle-class households in Bali. Additionally, awareness of subsidy policies does not mediate the relationship between income, price, and practicality with 3 kg LPG consumption. This suggests that although upper-middle-class households may understand that 3 kg LPG is a subsidized product for lower-income groups, this knowledge cannot significantly influence their consumption behavior. According to the Theory of Planned Behavior (Ajzen & Schmidt, 2020), awareness of subsidy policies can influence behavior by forming attitudes, subjective norms, and perceived behavioral control. However, when this awareness is not strong enough to change attitudes or overcome existing consumption habits, its impact on consumption behavior becomes insignificant. Moreover, this theory posits that external factors, such as income and price, only influence behavior if mediated through psychological mechanisms like awareness or intention. The insignificant mediating effect suggests that the relationship between income, price, and practicality with 3 kg LPG consumption occurs directly, without subsidy awareness.

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This finding can also be explained through the Value-Action Gap Theory (de Bernardi & Waller, 2022; Meistrup & Klitmøller, 2023; A. Williams & Hodges, 2022), which asserts that knowledge or awareness does not always translate into tangible actions. In this context, although households are aware of the subsidy policy, they continue to use 3 kg LPG due to other factors such as habits, ease of access, or convenience, which outweigh the influence of awareness. From the perspective of Cognitive Dissonance Theory (Cooper & Carlsmith, 2015), upper-middle-class households may experience cognitive dissonance between their understanding of the subsidy policy and their consumption behavior. However, this dissonance can be minimized through justifications such as accessibility or efficiency, rendering subsidy awareness ineffective as a behavioral change driver or mediating factor. These results emphasize that while awareness of subsidy policies is important, it is not strong enough to be a significant mediating mechanism in influencing 3 kg LPG consumption among upper-middle-class households.

These findings differ from previous studies that demonstrated the importance of subsidy awareness in driving LPG adoption and usage. Gill-Wiehl et al. (2022) and Patil et al. (2021) found that awareness of subsidy policies, such as India's Pradhan Mantri Ujjwala Yojana (PMUY) program, significantly increased LPG adoption, particularly among low-income households. Similarly, Woolley et al. (2022) in Rwanda observed that awareness of LPG subsidies and charcoal ban policies increased households' intentions to switch to LPG. These findings suggest that awareness of the benefits and objectives of subsidy policies can be a driving factor for LPG adoption. However, in the context of upper-middle-class households in Bali, their socioeconomic conditions may explain the insignificant impact of awareness on 3 kg LPG consumption. Greve and Lay (2023) noted that subsidy removal could prompt households to revert to traditional fuels. However, households with higher economic capacity are less likely to be influenced by subsidy awareness due to their accessibility and preference for convenience. Sulistio et al. (2016) also highlighted that the mistargeted distribution of subsidies in Indonesia makes access to 3 kg LPG more dependent on distribution factors than awareness.

Additionally, Guta et al. (2024) demonstrated that social determinants such as education, economic status, and community influence play a significant role in energy consumption decisions. In the case of upper-middle-class households, these factors may be more dominant than subsidy awareness, reducing its significant impact on consumption. Overall, these findings indicate that while awareness of subsidy policies is important, its influence on the consumption of 3 kg LPG by upper-middle-class households in Bali is more complex and affected by non-economic factors such as habits, preferences, and accessibility. This underscores the importance of policy strategies that enhance awareness and ensure equitable distribution and effective oversight.

CONCLUSIONS

This study reveals the complex dynamics of consumption and awareness of the 3 kg LPG subsidy policy among upper-middle-class households in Bali. Income was found to have a positive but insignificant effect on subsidy policy awareness, indicating that income

levels do not entirely determine awareness. Conversely, price and practicality positively affected policy awareness, emphasizing the importance of functional product attributes and economic factors in enhancing public understanding of subsidies. However, income, price, and practicality each had adverse and insignificant effects on consuming 3 kg LPG. This suggests that economic or utilitarian factors do not solely drive upper-middle-class households' decisions to use 3 kg LPG but are more influenced by habits or accessibility. Awareness of the subsidy policy also did not mediate the relationship between income, price, and practicality with consumption, indicating that although households may be aware of the subsidy, this knowledge is insufficient to alter their consumption behavior.

To enhance the effectiveness of the subsidy policy, the government needs to strengthen the distribution system to ensure that 3 kg LPG is better targeted and accessible to low-income groups. Public education should also be enhanced through campaigns emphasizing the benefits of subsidies, particularly for groups that do not directly rely on them. Additionally, introducing alternative energy solutions, such as induction stoves, could be a long-term strategy to reduce reliance on subsidized LPG. The government must also maintain price stability for 3 kg LPG to reinforce public policy signals and increase consumer awareness of the subsidies.

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