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Housewives' Preferences Using Melon Gas Cylinders: Analytic Hierarchy Process (AHP) Approach

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ABSTRACT

This study aims to analyze the preferences of homemakers when choosing the type of melon gas cylinder using the Analytic Hierarchy Process (AHP) method. The problem addressed is determining the factors that most influence homemakers' decisions in choosing between subsidized and non-subsidized gas. This research employs a quantitative method with AHP to analyze homemakers' preferences when selecting melon gas cylinders. AHP breaks down complex problems into a simple hierarchical structure, facilitating priority determination. The study involves homemakers chosen through purposive sampling. Data were collected through questionnaires covering relevant criteria and sub-criteria, using a Likert scale to measure the importance of each criterion. The research results based on dynamic sensitivity analysis show that price is the most important factor, followed by ease of use. This study provides a clear picture of the relative weights of various criteria and alternatives when choosing melon gas cylinders. The study's conclusion indicates that homemakers prefer subsidized gas over non-subsidized gas.

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1. INTRODUCTION

LPG gas as a household fuel has become a basic necessity in Indonesia. One popular type of gas cylinder is the melon cylinder (3 kg), which the government subsidizes. This subsidy aims to assist low-income communities in meeting their daily energy needs. However, homemakers' preferences in choosing the type of melon gas cylinder can be influenced by various factors such as price, availability, safety, and ease of use (Sukamdani et al., 2023).

Conducting a practical gap analysis using the Analytic Hierarchy Process (AHP) approach to understand housewives' preferences for using melon gas cylinders is of paramount importance. This study delves into the factors that influence housewives' choices, such as price, availability, safety, and ease of use, all of which are crucial in decision-making related to LPG gas usage. While numerous studies have explored LPG usage and the factors influencing household fuel choices, there remains a dearth of analysis that specifically links these preferences to the social and economic context in Indonesia. This is particularly true when it comes to the use of AHP as an analytical method, making our research a unique and valuable addition to the existing literature.

The initial equipment cost for using LPG often becomes a significant barrier to LPG adoption in developing countries, including Indonesia. Research shows that government support in providing initial equipment, such as gas cylinders and LPG stoves, is crucial for increasing LPG usage among households (Thoday et al., 2018; Lestarianingsih & Addison, 2021; Sukamdani et al., 2023). In the Indonesian context, where many

homemakers are the primary decision-makers in selecting energy sources for cooking, it is essential to understand how subsidies and availability influence their decisions (Vyas et al., 2021; Kalli et al., 2022). Previous studies indicate that subsidies can enhance LPG accessibility but often do not reach low-income households that need more support (Pollard et al., 2018; Kar et al., 2020).

Furthermore, challenges in meeting LPG market needs can be addressed with a more systematic and data-driven approach. Gould and Urpelainen (2019) emphasize the importance of strategies based on understanding consumer behavior and preferences. However, this research did not use AHP as an analytical tool, which could significantly contribute to a more structured evaluation of homemakers' preferences. By applying AHP, researchers can identify key factors influencing homemakers' decisions in choosing LPG, including economic, social, and cultural aspects (Apriyanti et al., 2023; Singh et al., 2020; Sukamdani et al., 2023).

The novelty of our research lies in the application of AHP to analyze housewives' preferences in using melon gas cylinders, a topic that has not been extensively discussed in existing literature. By using AHP, our research provides insights into the factors influencing these preferences and generates more targeted recommendations for the government and producers. These recommendations aim to enhance the distribution and use of melon gas cylinders in the community, thereby making a tangible impact on the energy sector.

Our practical gap analysis underscores the need for further research. While there are existing studies discussing LPG usage and the factors influencing consumer decisions, there is still a lack of analysis that specifically links housewives' preferences to Indonesia's social and economic context. Furthermore, the application of AHP as an analytical method in this context also fills a gap that our research aims to fill. By addressing these gaps, our research is expected to make a significant contribution to understanding the preferences for using melon gas cylinders among housewives.

This research analyzes homemakers' preferences for melon gas cylinders with an AHP approach. By understanding the factors influencing these preferences, more precise recommendations can be provided to the government and producers to improve the distribution and use of melon gas cylinders in the community.

In summary, "household" refers to the unit of residence, "housemaker" refers to the role of managing the household (regardless of gender), and "housewife" specifically refers to a woman fulfilling that role. Here's an explanation of the differences between these three terms:

- a) Household: This word refers to everyone living in a house or housing unit. It includes families or individuals living together and sharing resources such as food and facilities. In a broader context, "household" can also refer to an economic unit that operates independently.
- b) Housemaker: This term describes someone, usually a woman, who is responsible for managing a household. A homemaker is involved in various tasks such as cooking, cleaning, and caring for children. This term emphasizes the role and responsibilities in managing the home rather than employment outside the home.
- c) Housewife: This term specifically refers to a woman who manages the household and usually does not work outside the home. "Housewife" tends to be more traditional and is often associated with more classic gender roles. While similar to "homemaker," "housewife" emphasizes gender and specific social roles.

2. RESEARCH METHOD

Research Approach and Data Collection. This study adopts a quantitative approach using the Analytical Hierarchy Process (AHP) method to analyze homemakers' preferences in using melon gas cylinders. A quantitative approach was chosen because it allows researchers to measure and analyze data statistically, providing objective and reliable results. The AHP method was selected for its ability to break down complex problems into more superficial hierarchical structures, facilitating the determination of priorities and making more objective decisions (Saaty & Vargas, 2012).

The population in this study consists of homemakers who use melon gas cylinders in a specific area. The research sample was taken through purposive sampling, selecting respondents with relevant knowledge and experience with the research topic. The sample used in this study includes homemakers considered representative enough to reflect the preferences of homemakers in using melon gas cylinders. Using purposive sampling enables researchers to obtain more in-depth information from respondents who meet specific criteria (Sugiyono, 2018; Sukwika, 2023). Data were collected through a questionnaire specifically designed for this study. The questionnaire included questions regarding criteria and sub-criteria relevant to the preference for melon gas cylinders. The questions in the questionnaire were designed using a Likert scale to measure respondents' levels of importance regarding each established criterion and sub-criterion.

AHP Hierarchical Structure. The AHP process begins with establishing a hierarchical structure consisting of the main goal, criteria, sub-criteria, and alternatives. The main goal of this study is to determine homemakers' preferences for using melon gas cylinders. The criteria used include: (1) Price: Assessing the extent of the price of the melon gas cylinder's influence on purchasing decisions. (2) Availability: Measuring how easily homemakers can obtain melon gas cylinders in the market. (3) Safety: Evaluating the safety level of using melon gas cylinders daily. (4) Ease of Use: Measuring how easy it is for homemakers to use melon gas cylinders in cooking activities. (5) Quality: Assessing the quality of the melon gas cylinder, including durability, materials, and overall performance in daily use. Each criterion is then broken down into more specific sub-criteria, facilitating the pairwise comparison process.

The next step involves conducting thorough pairwise comparisons for each criterion and sub-criterion. Respondents are asked to compare each pair of criteria and sub-criteria based on their level of importance. The results of these pairwise comparisons are then meticulously processed using a pairwise comparison matrix to produce weights or priorities for each criterion and sub-criterion. These weights reflect the relative importance of each criterion and sub-criterion in determining housewives' preferences (Saaty & Vargas, 2012).

Analysis and Recommendations. After obtaining the weights for each criterion and sub-criterion, AHP analysis is used to formulate impactful recommendations for the government and producers. These recommendations are expected to significantly enhance the distribution and use of melon gas cylinders in the community. They are designed to assist in designing more effective strategies to meet the needs and expectations of housewives regarding the use of melon gas cylinders.

3. RESULTS AND DISCUSSIONS

Figure 1 shows the Analytic Hierarchy Process (AHP) analysis results for the study on homemakers' preferences in using melon gas cylinders. AHP is a multi-criteria decision-making method that allows complex problems to be broken down into simpler hierarchies (Saaty & Vargas, 2012).

The hierarchy of criteria and sub-criteria used in this analysis includes (1) Price (0.359), where the Price of the melon gas cylinder (0.250) and the refill cost (0.750) are considered. (2) Quality (0.084), where cylinder durability (0.250) and safety (risk of leakage, explosion) (0.750) are assessed. (3) Ease of Use (0.273), focusing on ease of operation (0.750) and cylinder replacement process (0.250). (4) Availability (0.152), including accessibility at nearby stores (0.750) and availability in certain areas (0.250). (5) Safety (0.132), considering the applied safety standards (0.250) and reviews from other users (0.750). The final results show preferences: Subsidized Gas: 0.542 (54.2 percent), and Non-Subsidized Gas: 0.458 (45.8 percent).

Interpretation of Results:

- a) Price is the most important factor (35.9 percent) in homemakers' preferences, with refill costs prioritized over the cylinder price. This aligns with Budya and Arafat's (2011) findings regarding the importance of economic factors in LPG adoption in Indonesia.
- b) Ease of use ranks second (27.3 percent), emphasizing operational ease. This confirms the research by Gould and Urpelainen (2018) on the importance of practical aspects in adopting clean fuels.

- c) Availability (15.2 percent) and safety (13.2 percent) are also significant considerations, highlighting the importance of distribution and safety perceptions in LPG adoption (Thoday et al., 2018).
- d) Despite having the lowest weight (8.4 percent), Quality remains a factor to be considered, especially concerning risks of leakage and explosion.
- e) The slightly higher preference for subsidized gas (54.2 percent) indicates that subsidy policies still significantly impact consumer choices (Kojima, 2011).

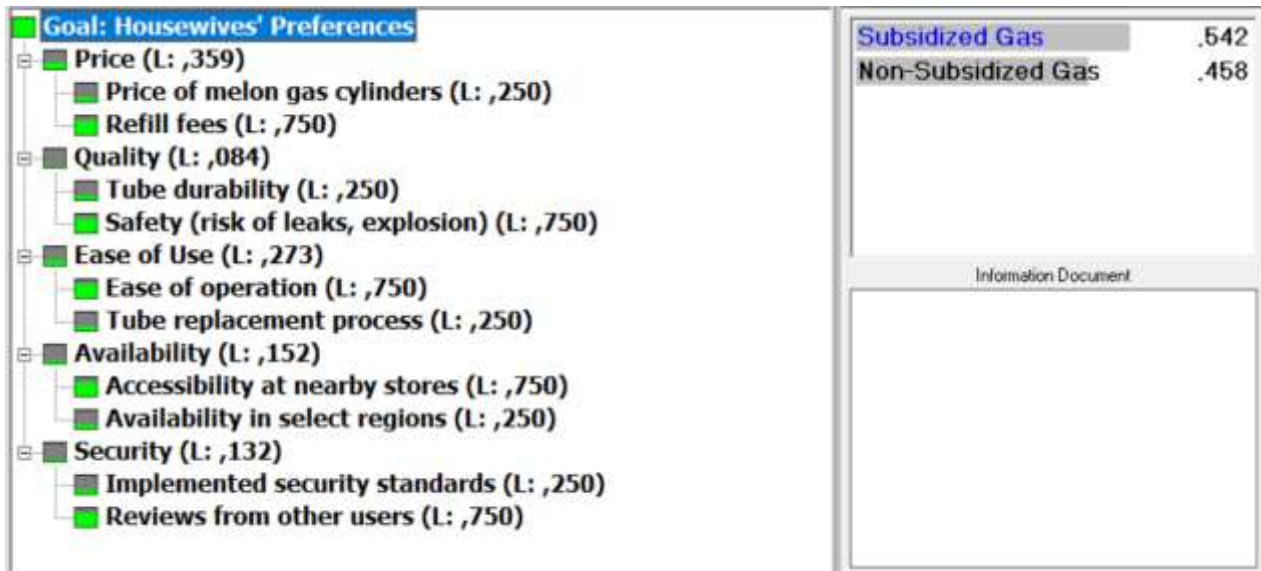


Figure 1. Results of the Analytic Hierarchy Process Analysis (AHP)
Source: Data processing results (2024)

These results demonstrate that Price is the most crucial factor in homemakers' preferences, followed by ease of use. This finding aligns with Budya and Arofat's (2011) research, highlighting the significance of economic factors in LPG adoption in Indonesia.

Figure 2 illustrates the performance sensitivity analysis results using the Analytic Hierarchy Process (AHP) for homemakers' preferences in choosing gas cylinders between subsidized and non-subsidized gas.

Several key points from the graph include: (1) The criteria used in the analysis encompass Price, Quality, Ease of Use, Availability, and Safety. (2) The blue line represents preferences for Subsidized Gas, while the red line indicates Non-Subsidized Gas. (3) It is evident that Subsidized Gas is preferred in terms of Price, whereas Non-Subsidized Gas excels in Quality. (4) For the criteria of Ease of Use, Availability, and Safety, both types of gas show relatively close preference values, with Non-Subsidized Gas slightly ahead. (5) Overall, Subsidized Gas has a slightly higher preference than Non-Subsidized Gas.

This AHP analysis enables a deeper understanding of the factors influencing consumer preferences when selecting gas cylinders. The method effectively breaks down complex issues into simpler, measurable hierarchies (Mu & Pereyra-Rojas, 2017). The results align with previous studies indicating that Price remains a primary factor in household energy product selection in developing countries (Kojima, 2011). However, factors like Quality and safety also play crucial roles, especially for specific consumer segments (Budya & Arofat, 2011). This study provides valuable insights for policymakers and marketers in understanding consumer preferences for gas cylinders, which can be leveraged to enhance distribution and marketing strategies for household energy products (Prasetyo & Kusumawati, 2021).

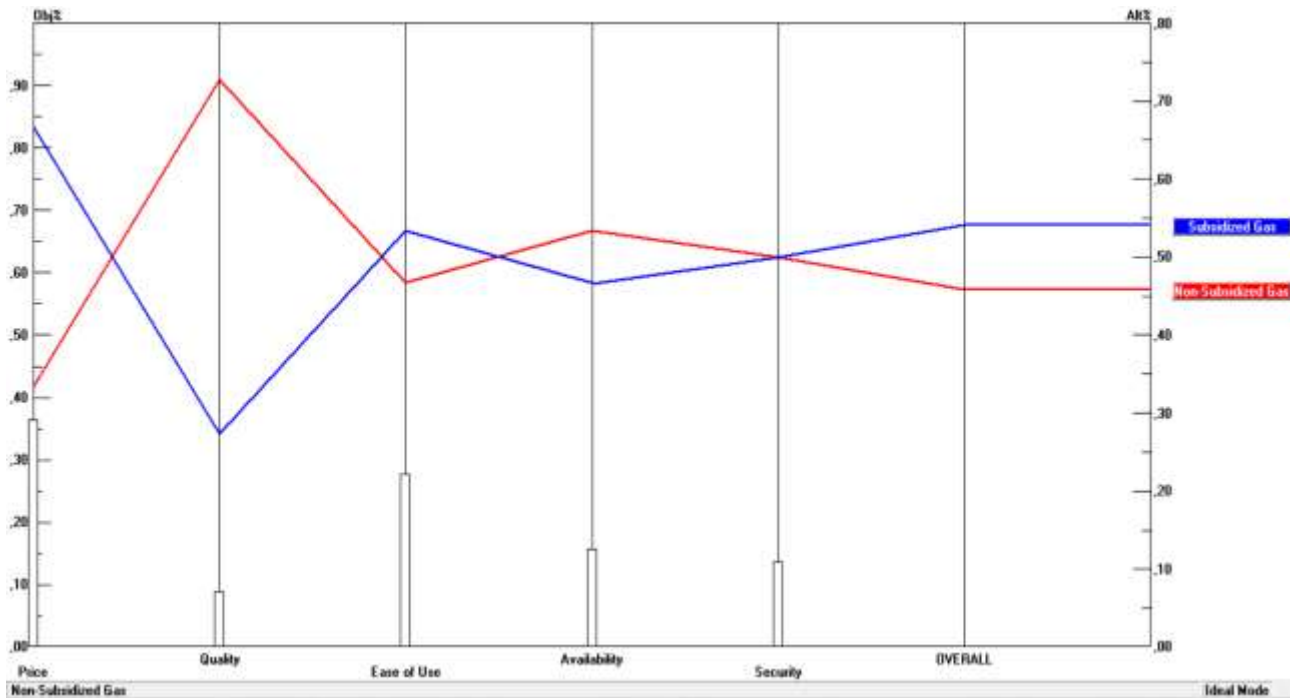


Figure 2. Performance Sensitivity Analysis Results
Source: Data Processing Results (2024)

Figure 3 presents the results of the dynamic sensitivity analysis using the Analytic Hierarchy Process (AHP) for homemakers' preferences in choosing melon gas cylinders. This analysis provides a clear picture of the relative weights of various criteria and alternatives (Saaty & Vargas, 2012).

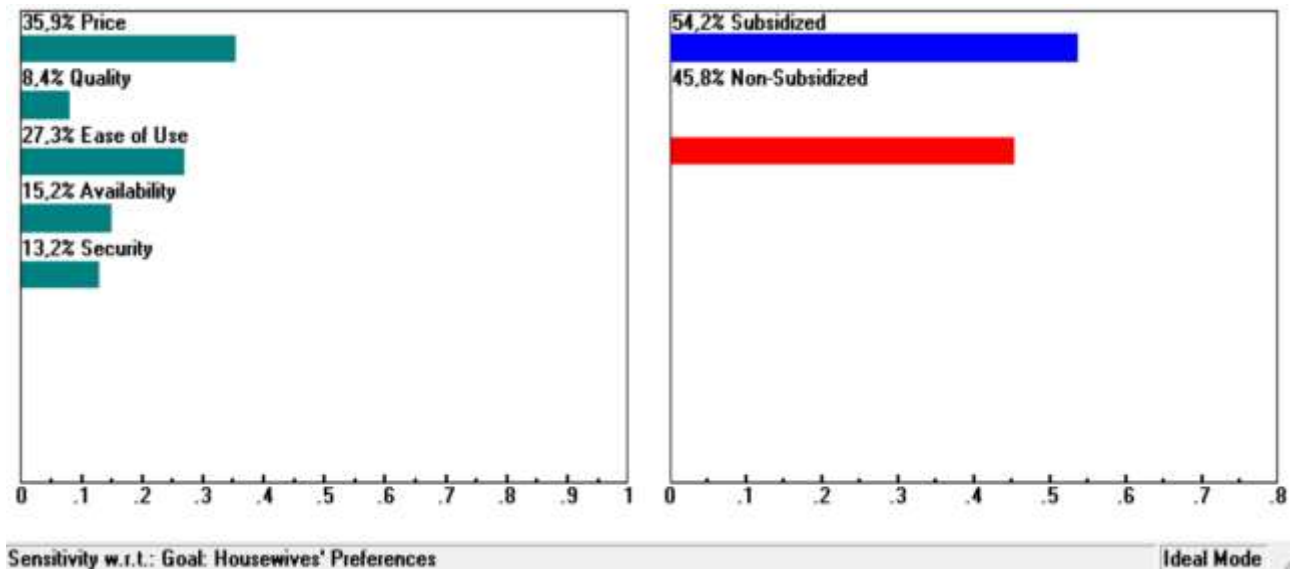


Figure 3. Dynamic Sensitivity Analysis Results
Source: Data processing results (2024)

The detailed description of the figure includes: (1) Selection Criteria (Left Panel): Price: 35.9 percent, Quality: 8.4 percent, Ease of Use: 27.3 percent, Availability: 15.2 percent, and Safety: 13.2 percent. (2) These results indicate that Price is the most critical factor for homemakers in selecting gas cylinders, followed by ease of use. This is consistent with the research by Budya and Arofat (2011), emphasizing the importance of economic factors in LPG adoption in Indonesia. (3) Preference Alternatives (Right Panel): Subsidized Gas: 54.2 percent, and Non-Subsidized Gas: 45.8 percent.

Subsidized gas has a slightly higher preference compared to non-subsidized gas. This reflects the importance of subsidies in consumer purchasing decisions, especially for household energy products (Kojima, 2011). This analysis provides essential insights for policymakers and marketers: (1) The importance of price in consumer preferences indicates that pricing strategies and subsidy policies remain vital factors in LPG adoption (Prasetyo & Kusumawati, 2021). (2) Ease of use is the second most important factor, suggesting the need to focus on product design and consumer education to enhance adoption (Gould & Urpelainen, 2018). (3) Although safety has the lowest weight, it does not imply that this factor is unimportant. It may reflect the perception that all gas cylinders meet minimum safety standards (Thoday et al., 2018). (4) The relatively balanced preferences between subsidized and non-subsidized gas indicate the potential for a gradual transition toward reduced subsidies while still considering consumer purchasing power (Sánchez-Jacob et al., 2018).

Figure 4 shows the Analytic Hierarchy Process (AHP) analysis results for the study on homemakers' preferences in using melon gas cylinders. AHP is a multi-criteria decision-making method that enables quantitative assessment of factors influencing decisions (Saaty & Vargas, 2012).

Based on the figure, the priority criteria in homemakers' selection of melon gas cylinders are as follows: (1) Price: 0.359 (35.9 percent), (2) Ease of Use: 0.273 (27.3 percent), (3) Availability: 0.152 (15.2 percent), (4) Safety: 0.132 (13.2 percent), and (5) Quality: 0.084 (8.4 percent). An inconsistency level of 0.05 indicates that respondent assessments are consistent, as this value does not exceed the acceptable limit of 0.1 (Saaty & Vargas, 2012).

These results demonstrate that Price is the most crucial factor in homemakers' preferences, followed by ease of use. This finding aligns with Budya and Arofat's (2011) research, highlighting the significance of economic factors in LPG adoption in Indonesia.

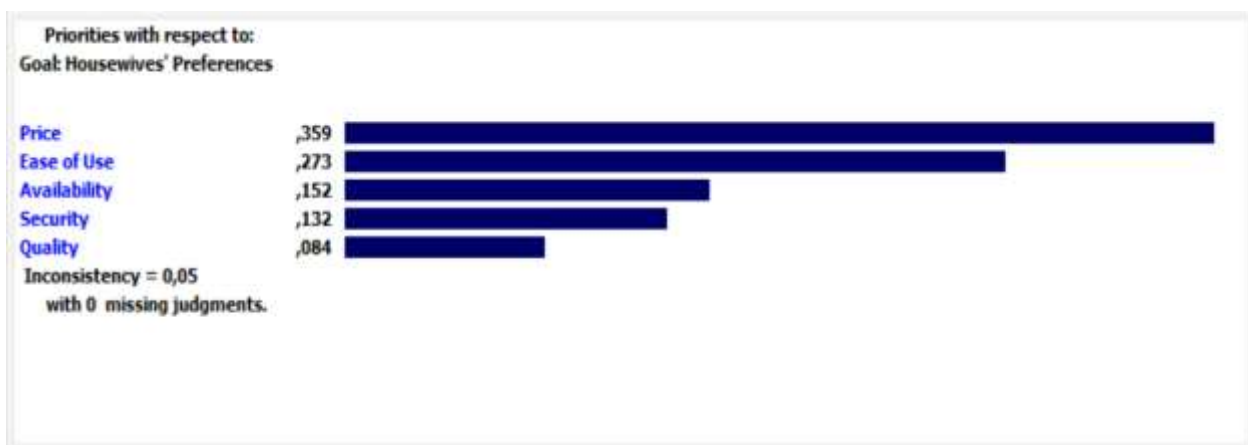


Figure 4. Housewife Preferences in Using Gas Cylinders

Source: Data processing results (2024)

Interpretation of Results:

- The dominance of the price factor (35.9 percent) indicates that economic aspects remain a primary consideration for homemakers when selecting gas cylinders. This reinforces the importance of subsidy policies in influencing consumer preferences (Kojima, 2011).
- Ease of use (27.3 percent) is the second most important factor, suggesting that product design and practical usage aspects play a significant role in LPG adoption (Gould & Urpelainen, 2018).
- Availability (15.2 percent) and safety (13.2 percent) occupy medium priority, indicating that distribution and safety aspects are also important considerations for consumers (Thoday et al., 2018).
- Quality (8.4 percent) has the lowest priority but remains a factor in gas cylinder selection.
- this analysis provides valuable insights for policymakers and marketers in designing effective strategies to enhance the adoption and use of LPG gas cylinders among homemakers (Prasetyo & Kusumawati, 2021).

4. CONCLUSION

This study concludes that homemakers prefer melon gas cylinders to subsidized rather than non-subsidized gas. Price is the most critical criterion, followed by ease of use. Although non-subsidized gas excels in Quality, both types of gas have relatively close preference values regarding ease of use, availability, and safety. Overall, subsidized gas has a slightly higher preference. This analysis provides a clear picture of the relative weights of various criteria and alternatives for selecting melon gas cylinders.

Based on the research findings, it is recommended that the government continue or enhance subsidies for melon gas cylinders to maintain homemakers' preferences for subsidized gas. Additionally, safety campaigns regarding gas cylinder usage must be improved to reduce risks of leakage and explosion. Producers of subsidized gas are also encouraged to enhance their product quality to be more competitive with non-subsidized gas. Sellers and distributors should provide training and education on the safe handling and storage of gas cylinders and improve customer service to assist homemakers in selecting and using melon gas cylinders safely and efficiently. Implementing these recommendations will enhance homemakers' satisfaction and safety in using melon gas cylinders and support more effective and sustainable energy policies.

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