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ANALYSIS OF RICE DEMAND IN RESPONSE TO RISING PRICES

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Abstract

Rice plays a central role in the daily lives of Indonesians, not only as a staple food but also as a vital component of the country's food security and economic stability. This study aims to analyze the impact of rising rice prices on rice demand in Indonesia, focusing on price and income elasticity estimates. Utilizing national time series data from 2008 to 2022 and regional data from Medan, Ambon, and Sidoarjo, this research employs both log-linear regression models and the QUAIDS econometric approach. This findings indicate that rice demand is price-inelastic, with a price elasticity of approximately –0.37 in the short term and –0.79 in the long term. Income elasticity is positive but inelastic (around 0.24), while population elasticity exceeds one (>1), indicating high sensitivity. This suggests that although rice prices have increased, demand has declined only marginally, primarily because rice is a staple commodity that is difficult to substitute. However, low-income households are disproportionately affected, as they allocate a significant portion of their income to rice. Policy recommendations include price stabilization programs, direct assistance for vulnerable groups, and food diversification campaigns to ensure national food security.

Keywords: *Rice Demand; Price Elasticity; Household Consumption; Rice Prices; Food Policy.*

INTRODUCTION

Rice demand generally declines as prices increase, following the law of demand: when the price rises, the quantity demanded falls, assuming other factors remain constant (ceteris paribus). However, for staple goods such as rice, price sensitivity is known to be low, making the demand relatively inelastic. For instance, a study in Medan found that a 1% increase in rice prices led to only a 0.52% decrease in demand, confirming inelastic behavior. National macro-economic analysis further supports this, with price elasticity estimated at around –0.26, indicating that a 10 % increase in rice prices reduces demand by less than 10 % (Rozi et al., 2023). Rice is the primary staple food for over 90% of Indonesian households, making it a strategic commodity in terms of national food security. Thus, any fluctuation in rice prices significantly affects household purchasing power, especially among low-income groups. Although economic theory posits that higher prices reduce demand, rice remains an exception due to its essential nature and lack of close substitutes. This is what defines inelastic demand.

Existing studies emphasize the centrality of rice in household consumption. According to Hafizah et al., (2021), Indonesian households rely heavily on rice, with approximately 97% of household carbohydrate intake coming from rice. Their QUAIDS-based analysis also reveals limited substitution between rice and other staple foods, and cross-price elasticity estimates that constrain progress toward food diversification. This finding underscores the importance of understanding how households adjust consumption in response to rising rice prices. Rice prices have been increasing steadily in recent years; it is crucial to assess the extent to which demand remains stable or declines. Furthermore, understanding regional differences is equally important. Medan, Ambon, and Sidoarjo were selected as representative areas from different parts of Indonesia. These cities illustrate the regional diversity in rice consumption behavior and socioeconomic dynamics. Therefore, this study aims to estimate price and income elasticities of rice demand both nationally and regionally, assess differences across socioeconomic groups, and offer data-driven policy recommendations to safeguard food consumption and support vulnerable populations.

The relatively low price sensitivity has important implications. While the overall quantity of rice consumed may not fall drastically with rising prices, the economic burden on households,

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especially low-income families, increases substantially. These households allocate a larger share of their income to food, and particularly to rice, than wealthier households. Consequently, rice price increases disproportionately affect their purchasing power and can force difficult trade-offs, such as reducing consumption of other nutritious foods or essential services like education and healthcare. This dynamic underscores why price volatility in rice markets can exacerbate food insecurity and deepen socioeconomic inequalities.

Over recent years, rice prices in Indonesia have exhibited an upward trend influenced by various factors such as climate change, supply chain disruptions, changes in government policy, and global commodity price fluctuations. Climate change has significantly impacted rice production in Indonesia. A study by Alghiffary & Perwithosuci (2025) analyzed panel data from 33 provinces between 2018 and 2023 and found that climate anomalies, particularly changes in rainfall patterns, have led to shifts in harvest seasons and reduced rice supply, thereby increasing prices. Given these challenges, it is imperative to examine how rice demand responds to such price changes. Key questions arise: Do consumers reduce rice consumption, switch to alternative carbohydrate sources like cassava or maize, or maintain their usual consumption despite price hikes? Answers to these questions are crucial for designing effective policies that balance affordability with sustainable market functioning, Sugiyono (2018) explains that quantitative, qualitative, and R&D methods provide systematic approaches for collecting and analyzing data, ensuring that research produces valid and reliable results, Browning & Zupan (2020) highlights key microeconomic concepts and their practical applications, emphasizing how consumer behavior, market structure, and price mechanisms influence economic decision-making.

In this context, three main variables are central to understanding rice demand dynamics: rice price, per capita income, and population size. The price variable reflects the direct market mechanism that influences consumption behavior through affordability. The income variable captures purchasing power and determines the ability of consumers to maintain or adjust consumption levels despite price fluctuations. Meanwhile, the population variable represents demographic pressure, as growing populations increase aggregate demand even if individual consumption remains constant. Analyzing the interaction of these three variables provides a comprehensive picture of both economic and demographic influences on rice consumption patterns across Indonesia. Hence, identifying their relative elasticities is essential for policymakers to formulate strategies that ensure rice availability, stabilize prices, and strengthen national food security. These findings underscore Indonesian households' structural dependence on rice and highlight the persistent challenges in advancing food diversification at the national level.

RESEARCH METHODS

Research Type and Design

This research adopts a quantitative approach using econometric modeling to analyze the relationships between rice prices, income, population size, and rice demand. The main objective is to estimate both short-run and long-run price and income elasticities.

Location and Time of Research

The study covers three representative urban areas Medan, Ambon, and Sidoarjo; as well as national-level data. The time series analysis spans the period from 2008 to 2022. These locations were chosen to reflect the geographic, economic, and cultural diversity of Indonesia's urban landscape, ensuring a comprehensive and balanced analysis across regions. Sapthu et al., (2024) found that rice demand in both Ambon and Medan is price-inelastic, indicating that consumers in these regions maintain relatively stable consumption levels even when prices increase.

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- **Medan (North Sumatra)** represents the **western region** of Indonesia and is a major urban and commercial hub with significant food distribution networks. Its inclusion provides insight into consumption behavior in one of the country's largest and most economically active cities outside Java.
- **Ambon (Maluku)** serves as a case study for **eastern Indonesia**, a region often characterized by logistical challenges, higher food prices, and different consumption patterns due to its insular geography. Including Ambon allows the study to address regional disparities and food accessibility issues.
- **Sidoarjo (East Java)** represents the **central region** and is situated within one of the most densely populated and agriculturally productive provinces in the country. As part of the Java economic corridor, Sidoarjo reflects urban consumption dynamics in a region with better infrastructure and market access.

In addition to regional case studies, the research incorporates national-level data, allowing for macro-level analysis and comparison. This broader dataset enables the identification of overarching trends and elasticities that apply across Indonesia, while also contextualizing regional differences.

Data Analysis Technique

Log-Linear Regression Model
A log-linear model is a type of regression where the dependent variable and/or the independent variables are transformed using logarithms. In demand analysis, it's often used to estimate elasticities, which are how much demand changes in response to changes in price or income.

For a simple demand model:

$$ln\,(Q) = \beta_0 + \beta_1 ln\,(P) + \beta_2 ln\,(Y) + \varepsilon$$

- Q: Quantity demanded (e.g., rice consumption)
- P: Price of the good
- Y: Income
- β_1: Price elasticity of demand
- β_2: Income elasticity of demand
- ε: Error term

Elasticity interpretation: Coefficients (β_1, β_2) are interpreted as **elasticities**.
Linear in logs: Helps stabilize variance (reduces heteroskedasticity) and normalize data.
Useful for inelastic goods like rice, where small price changes lead to small demand responses.

RESULTS AND DISCUSSION

Rice demand is Inelastic to Price. All elasticity estimates show |Ed| < 1, confirming that rice is price-inelastic. A 1% increase in price only results in a 0.37% decrease in demand in the short run (Septiadi & Joka, 2019). This is due to the absence of perfect substitutes for rice in Indonesian diets, and deep-rooted cultural preferences for rice as the main carbohydrate source.

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Table 1. Estimated Elasticities and Significance of Factors Affecting Rice Demand

Variable	Coefficient (β)	Elasticity	Significance (p-value)	Interpretation
Rice Price (P)	–0.37	Inelastic	0.003	1% price increase → 0.37% decrease in demand
Per Capita Income (Y)	0.24	Inelastic	0.011	1% income increase → 0.24% increase in demand
Population Size (N)	1.56	Elastic	0.000	1% population growth → 1.56% increase in demand

(Source: Primary Nasional Data Analysis)

$R^2 = 0.84$, indicating that 84% of the variation in rice demand is explained by changes in price, income, and population.

Income Elasticity: Also Inelastic

An income elasticity of 0.24 indicates that even as income rises, rice consumption increases only slightly. This implies that rice is a normal good but has reached a saturation point in consumption, particularly among middle and high-income households.

Population Elasticity: Highly Elastic

Population growth strongly influences rice demand. With an elasticity of 1.56, it remains the most dominant factor. This supports projections that rice demand will continue to grow alongside population expansion.

Regional Comparison

The elasticity results in Table 1 represent the aggregate national model incorporating data from three representative cities: Medan, Ambon, and Sidoarjo. However, regional disparities are evident, as illustrated by the Medan-specific estimate (–0.52) (Sembiring et al., 2023), while Ambon and Sidoarjo data contribute to the national average without separate estimations due to data constraints.

Policy Implications

Although demand does not significantly fall with rising prices, the economic burden on poor households increases due to their higher expenditure share on rice. Therefore, price stabilization by Badan Urusan Logistik (BULOG), the State Logistics Agency of Indonesia and regular market operations are critical. Despite the relative price inelasticity of rice demand, as evidenced by empirical findings such as the 0.52% decrease in consumption for every 1% increase in price in Medan, rising rice prices still pose a significant economic burden, particularly for low-income households. This is due to the disproportionate share of household expenditure that the poor allocate to staple foods, especially rice, which remains the primary caloric source for the majority of Indonesians, A study by Kusumawardani et al., (2024) demonstrated that income and price variations play a crucial role in determining rice demand elasticity, confirming that rice consumption in Indonesia remains relatively inelastic even when prices increase or household income changes.

For wealthier households, rice constitutes a smaller fraction of their overall consumption basket, meaning price increases have a less noticeable impact on their financial well-being. However, for the poorest quintiles, rice can account for over 20% or more of total household spending. Due to limited income, a larger share of spending in poor households goes toward basic necessities like food, compared to middle- and upper-income groups whose consumption patterns tend to be more diversified. In these cases, even minor price fluctuations can translate into

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substantial financial strain, forcing households to reduce consumption of other essential goods such as education, healthcare, or protein-rich foods. This, in turn, can lead to long-term adverse outcomes, including undernutrition, intergenerational poverty, and reduced human capital development. Therefore, while overall consumption levels may not sharply decline with rising prices due to the essential nature of rice, the welfare implications are significant and regressive. Price increases effectively act as a regressive tax, hitting the poor harder than the rich, despite similar quantities consumed. This makes price stability not just an economic goal, but a matter of social equity and justice. Sa'diyah et al., (2023) revealed that strategic food commodities in East Java, including rice, exhibit price-inelastic characteristics and elasticity estimates. According to the Ministry of Trade of the Republic of Indonesia (2022), fluctuations in staple food prices, including rice, have intensified in recent years due to supply chain constraints and market volatility.

In this context, the role of BULOG is crucial. BULOG is tasked with a mandate that extends beyond market efficiency and into the realm of public welfare and food security. Its operations include: Public stockpiling of rice to ensure adequate reserves during times of shortage or crisis; Market operations (Operasi Pasar) to intervene in retail markets and suppress excessive price volatility; Implementation of subsidized rice distribution programs, particularly for vulnerable populations during emergencies or seasonal price peaks. Through these interventions, BULOG plays a stabilizing role in the domestic rice market, mitigating the effects of supply-side shocks caused by natural disasters, crop failures, distribution bottlenecks, or external price pressures. Its ability to release stockpiled rice during such periods helps anchor market expectations and protect consumers, especially those in the lower-income brackets. Furthermore, BULOG's regular involvement in market operations contributes to price predictability, which is essential not only for household budgeting but also for maintaining social cohesion in a country where food inflation has historically been a trigger for public discontent.

In conclusion, the price inelasticity of rice demand does not imply the absence of vulnerability. On the contrary, it highlights the essential nature of rice and reinforces the need for effective and proactive state intervention in price stabilization. Strengthening BULOG's capacity, ensuring transparency in its operations, and aligning its activities with broader social protection programs will be critical in safeguarding food security and promoting inclusive economic resilience across Indonesia. Food diversification efforts should be paired with price incentives and education to encourage alternative carbohydrate consumption. Targeted assistance is needed for vulnerable groups to reduce food insecurity. Despite the inelastic nature of rice demand, price increases still pose a serious economic burden, especially for low-income households, who spend a disproportionately large share of their income on staple foods like rice. Based on the findings, the following policy directions are recommended:

Price Stabilization

Government intervention through BULOG remains essential, particularly during periods of price volatility. It is important to underscore the importance of Regular market operations to stabilize prices and prevent speculative price spikes, and maintain strategic buffer stocks to ensure supply continuity during disruptions. These tools not only help moderate price fluctuations but also protect vulnerable households from food insecurity. As such, BULOG's interventions should be sustained and strengthened as part of Indonesia's broader strategy for ensuring food affordability and social stability.

Targeted Social Assistance

As poor households are most vulnerable to food price shocks, direct assistance programs, such as rice subsidies or cash transfers, should be prioritized to cushion their purchasing power

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and reduce food insecurity. Sembiring et al. (2023) found that rice demand in Medan City is price-inelastic, indicating that households continue to consume rice at relatively stable levels despite rising prices.

Food Diversification Programs

Promoting the consumption of alternative carbohydrate sources (e.g., corn, cassava, sago) should be coupled with:

- Price incentives for both producers and consumers.
- Public education campaigns to shift dietary preferences and increase acceptance of non-rice foods .

Monitoring and Data-Driven Decision

Continuous updating of elasticity estimates and consumption patterns across different regions and income groups is crucial for responsive policymaking. Investing in high-frequency household surveys and integrating data from the Central Statistics Indonesia will support evidence-based interventions.

CONCLUSIONS AND SUGGESTIONS

Rice demand in Indonesia is inelastic, price increases do not proportionally reduce consumption. Low-income households are most affected by rising prices. Income growth does not significantly increase rice consumption due to saturation. Population growth is a major driver of rising rice demand. Policy Recommendations: Implement effective market operations, stock buffers of rice, and subsidies when necessary to prevent sharp price increases. Protect Vulnerable Groups: Provide direct rice assistance or targeted subsidies to low-income households to maintain food access. Promote Food Diversification: Encourage consumption of alternatives in rice (cassava, maize) through public campaigns and pricing incentives. Regularly update and monitor price, consumption, and elasticity trends to guide timely policy interventions,

REFERENCE

Alghiffary, M., & Perwithosuci, W. (2025). Rice Price and Climate Change: A Panel Study in Indonesia. *Proceeding ISETH (International Summit on Science, Technology, and Humanity)*, 466–473. https://doi.org/10.23917/iseth.5391

Browning, E. K., & Zupan, M. A. (2020). *Microeconomics: Theory and Applications*. John Wiley & Sons. https://books.google.co.id/books?id=uP-9DwAAQBAJ

Hafizah, D., Hakim, D. B., Harianto, H., & Nurmalina, R. (2021). Analisis Elastisitas Pendapatan Rumah Tangga di Indonesia [in Indonesian]. *Jurnal Ilmu Pertanian Indonesia*, *26*(3), 428–435. https://doi.org/10.18343/jipi.26.3.428

Kusumawardani, N. D., Purwanti, G. A., Sofwani, A., & Mondiana, Y. Q. (2024). Effect Of Income And Price Changes On Rice Demand Elasticity. *Jurnal Ekonomi*, *13*(04), 717–721.

Ministry of Trade of the Republic of Indonesia. (2022). *Report on the development of staple food prices (Kajian Analisis Harga Pangan Pokok, June 2022)*. Retrieved from https://bkperdag.kemendag.go.id/media_content/2022/05/file_kajian_analisis_harga_pangan_pokok_20220530134517e9xiyfrzj7.pdf

Rozi, F., Santoso, A. B., Mahendri, I. G. A. P., Hutapea, R. T. P., Wamaer, D., Siagian, V., Elisabeth, D. A. A., Sugiono, S., Handoko, H., & Subagio, H. (2023). Indonesian market demand patterns for food commodity sources of carbohydrates in facing the global food crisis. *Heliyon*, *9*(6). https://doi.org/10.1016/j.heliyon.2023.e16809

Received: 03-09-2025 Accepted: 25-11-2025 Publish: 29-12-2025

Sa'diyah, A. A., Nofal, B., Rofiatin, U., & Sinaga, A. M. H. P. (2023). Strategic Food Price Elasticity In East Java Indonesia. *Agrisocionomics: Jurnal Sosial Ekonomi Pertanian*, *7*(2), 448–460. https://ejournal2.undip.ac.id/index.php/agrisocionomics/article/view/17315

Sapthu, A., Louhenapessy, F. H., Saptenno, F., Louhenapessy, D., Duwila, U., & Jani. (2024). Analysis of the Elasticity of Rice Demand for Poor Households in Sirimau District, Ambon City in 2024. *ARRUS Journal of Social Sciences and Humanities*, *4*(3 SE-Articles), 419–428. https://doi.org/10.35877/soshum2684

Sembiring, D., Sitanggang, I. R., Nababan, O., & Frisnoiry, S. (2023). *Elasticity of rice demand in Medan City*. Humantech: Indonesian Multidisciplinary Scientific Journal, 2(8). Retrieved from https://journal.ikopin.ac.id/index.php/humantech/article/view/1850-1858

Septiadi, D., & Joka, U. (2019). Analisis respon dan faktor-faktor yang mempengaruhi permintaan beras Indonesia [in Indonesian]. *Agrimor*, *4*(3), 42–44. https://doi.org/10.32938/ag.v4i3.843

Sugiyono, P. D. (2018). Quantitative, qualitative, and R&D research methods. *Bandung:(ALFABETA, Ed.)*.