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Demand For Strategic Food in Rural Indonesia: Applying The Linear Approximation Of The Almost Ideal Demand System

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ABSTRACT

The urgency of studying strategic food demand in rural households serves as a basis for recommending the formulation of effective and sustainable strategic food policies. This study aims to examine the proportion of rural household expenditure on strategic food, identify the factors influencing rural household consumption of strategic food, and analyze income and price elasticity using the Marshallian approach. The research utilized 2023 Susenas data, which was then analyzed using the LA-AIDS model. The findings indicate that rice is the most preferred commodity among rural households and has a complementary relationship with other strategic commodities. Meanwhile, ruminant meat (beef, goat, and lamb) remains a luxury item for rural households. Government efforts are needed to encourage household consumption of alternative protein sources other than ruminant meat such as chicken, eggs and fish which are relatively affordable.

***Key Words**: Elasticity, Marshallian, Price, expenditure, Income*

BACKGROUND

Strategic food fulfillment is a crucial issue in many developing countries, including Indonesia, for both urban and rural households (Nurjasmi, 2021 ; Nita & Atem, 2020). The fulfillment of strategic food for rural households in Indonesia is a crucial aspect of national food security. Rural households, most of whom depend on the agricultural sector for their livelihoods, face their own challenges in meeting their food needs sustainably. The majority of the rural population is highly dependent on the agricultural sector as their main source of livelihood. Amidst the dynamics of the global economy and domestic challenges, such as fluctuations in strategic food prices, changes in consumption patterns, and limitations in food accessibility and distribution, understanding food demand patterns is very important (Ibnouf, 2001).

The amount of food consumption by rural households has generally decreased due to the increase in food prices (Ariani et al, 2018 ; Miranti & Syaukat, 2016 ; Saputro & Fidayani, 2020). So that household purchasing power will decrease which will cause several impacts including price increases which will reduce the real income of the population and price changes which will favor the poor by changing income distribution due to price increases which differ for each individual according to their income (Maulana, 2023).

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Numerous studies have explored how households adapt their consumption patterns in response to fluctuations in income and prices. Experts in economics, consumer behavior analysts, and policymakers recognize a strong correlation between economic growth and household consumption trends (Sinulingga et al, 2023). Household consumption patterns are also crucial for the business world because they are an important reference in making investment decisions in a country. The phenomenon of fluctuations in the availability of strategic food in Indonesia (Table 1) is also the basis for the importance of conducting strategic food demand studies. Studies in rural areas are important to conduct considering that the poverty rate in rural households is higher than the poverty rate in urban households (Kalinowski, S, 2020).

Table 1. Strategic Food Commodity Availability Data 2019-2024

Commodity	Availability Every Year (billion ton)						Growth Every Year
	2019	2020	2021	2022	2023	2024	%
Rice	31,083	31,813	31,056	31,571	32,544	39,134	4%
Corn	297	262	264	219	224	223	-33%
Soybean	2,979	2,659	2,593	2,575	2,579	2,950	-16%
Sugar	6,957	6,582	6,823	11,125	5,357	4,296	-30%
Cooking Oil	2,584	2,705	5,740	5,641	11,435	5,826	77%
Shallot	1,007	1,159	1,284	1,275	1,069	11,195	6%
Onion	535	594	518	591	592	628	10%
Red Chili Pepper	1,229	1,267	1,424	1,500	1,187	924	-4%
Chillies	1,341	1,472	1,353	1,507	1,224	978	-10%
Beef	593	506	545	647	570	827	-4%
Chicken	3,633	3,369	3,434	3,537	4,160	6,417	13%
Egg	4,659	5,038	5,157	5,043	6,119	6,218	24%

Sources: National Food Agency, 2024

Strategic food demand in rural Indonesia is not only influenced by household income, but also by price factors, consumer preferences, and government policies related to subsidies, tariffs, and the availability of food commodities. Rural households, which generally have lower incomes and are vulnerable to price changes, tend to be more sensitive to food price fluctuations than urban households. Therefore, analyzing food demand patterns in rural areas is important for formulating effective and sustainable food policies (Harahap, A. N., Sugianto, S., & Atika, A, 2024).

One approach that is often used to understand food demand patterns is Linear Approximation/Almost Ideal Demand System (LA/AIDS) (Arthatiani, F. Y., Kusnadi, N., & Harianto, H, 2018). This method enables a more precise assessment of food demand elasticity, including both price and income elasticity, providing a comprehensive understanding of how rural households respond to fluctuations in prices and income.

Food studies have been conducted by several researchers both in Indonesia and in other countries, including: Household Food Demand In Indonesia: A Two-Stage Budgeting Approach (Widarjono & Rucbha, 2016), Strategic Food Price Elasticity In East Java Indonesia (Sa'diyah et al, 2023), Food demand for carbohydrate sources: linear approximation-almost ideal demand

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system/LA-AIDS approach (Anindita et al, 2022), Modelling Sri Lankan consumption patterns using error corrected LA-AIDS (Rathnayaka et al, 2019), An estimation of food demand system in Romania–implications for population's food security (Alexandri et al, 2015), Dynamic food demand in urban China (Zhou et al, 2015), Nutrition transition and the structure of global food demand (Gouel & Guimbard, 2019), Consumer demand system of agrifood in Tanzania (Chongela et al, 2014). However, there has never been a study that specifically examines the demand for 11 strategic foods (rice, corn, soybeans, onions, chilies, poultry, eggs, ruminant meat, sugar, cooking oil, and fish) for rural households in Indonesia. The study aims to analyze the share of rural household expenditure on 11 strategic commodities in Indonesia, analyze the factors that influence rural household consumption of strategic foods, and analyze the elasticity of expenditure and prices of strategic foods. Several previous studies used the LA-AIDS Model analyzed with STATA software so that it can be used as a source of literature that supports the research that has been done. On the other hand, previous studies that have been presented generally only use partial analysis tests, for example only analyzing price elasticity without demand elasticity, and vice versa. This study conducted an overall analysis that includes price elasticity, and expenditure elasticity, as well as marginal share expenditure. It is hoped that the results of this study can produce more complete empirical data, for policy recommendations

The study uses the Linear Approximation Demand System (LA/AIDS) approach. This approach is a commonly used approach for demand analysis, but until now there has been no study that specifically examines 11 strategic commodities in Indonesia simultaneously, especially for poor Indonesia. This study explicitly frames the use of Marshallian (uncompensated) price elasticity as a direct bridge to market reality. This provides a more honest picture of how the real purchasing power of rural households is eroded by food inflation, information that is more intuitive and actionable by policymakers than theoretical Hicksian elasticity. The results of the study on income and price elasticity are expected to be used to design more adaptive social assistance programs (such as the Sembako/BPNT Program). For example, to examine the automatic adjustment of the value of assistance when food inflation in an area exceeds a certain threshold. In addition, the results of the study are also expected to provide empirical evidence to encourage consumption diversification programs. If it is proven that corn or cassava are strong substitutes for rice when prices rise, policies can be directed to strengthen the supply chain of these commodities.

RESEARCH METHODS

Data Collection Method

This research employs a quantitative approach utilizing descriptive statistical analysis techniques and econometric methods. The study relies on secondary cross-sectional data sourced from the March 2023 National Socio-Economic Survey (Susenas) in Indonesia, which is processed using STATA 17 software. The Susenas data encompasses rural households across Indonesia, covering aspects such as employment, income, expenditure, and consumption, along with various social, economic, and demographic characteristics of these households.

This study examines 11 key strategic food commodities in Indonesia, including rice, corn, soybeans, shallots, chilies, poultry, eggs, red meat, sugar, cooking oil, and fish & seafood. Since Susenas does not report the actual prices paid by households, unit prices are calculated by dividing total expenditure by the quantity purchased. The dataset consists of 80,705 rural households recorded in the March 2023 Susenas survey.

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Data Analysis

The research uses data from eleven Indonesian strategic food (rice, corn, soybeans, shallot, chilies, poultry, eggs, red meat, sugar, cooking oil, and fish & sea food). Based on the SUSENAS questionnaire 2023, the 1) Rice group consists of Rice (local, medium, premium, and imported rice), Sticky rice. 2) Corn group consists of Wet corn with skin, Corn kernels/rice, corn/titi corn. 3) Soybeans only soybeans. 4) Shallots consists of Shallots, garlic, onions. 5) Chilies consists of Red, green, cayenne pepper. 6) Poultry group consists of Broiler chicken meat, Mon Broiler chicken meat. 7) The Eggs group consists of Broiler chicken eggs, Non Broiler eggs, duck eggs/Manila duck eggs. 8) Red meat group consist of Beef, Goat, Lamb. 9) Sugar group consist of Granulated sugar, brown sugar, water sugar (sugar palm, coconut, lontar palm). 10) Cooking oil group consist of Cooking oil (palm, sunflower) Cooking oil (palm, sunflower). (11) Fish & sea food group consist of shrimp, lobster, squid, cuttlefish, octopus, clams, snails, snails, mussels, shrimp, and other freshwater animals.

Analysis of rural household share of strategic food in Indonesia (rice, corn, soybeans, shallot, chilies, poultry, eggs, red meat, sugar, cooking oil, and fish & sea food) was conducted using Microsoft Excel calculations. Meanwhile, factors that influence the share of strategic food expenditure were analyzed using the LA/AIDS model through the SUR method. The regression coefficient of the LA-AIDS results was then used to calculate expenditure elasticity and price elasticity. The analysis equation is further described as follows.

Analysis of Rural Household Expenditure Share on Strategic Commodities

Analysis of Rural Household Expenditure Share on Strategic Commodities is calculated using the following formula:

$$w_i = \frac{bi}{x} \times 100\% = \frac{p_i.q_i}{\sum \; p_i.q_i} \times 100\% \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where:

i : 1,2,...,11
i : 1 (rice), 2 (corn), 3 (soybean), 4 (shallot), 5 (chillies), 6 (poultry), 7 (egg), 8 (red meat), 9 (sugar), 10 (cooking oil), 11 (fish & sea food)
W_i : Proportion of commodity expenditure i (%)
bi : commodity expenditure i (Rp)
x : Total expenditure on staple foods (Rp)
p_i : Commodity prices i (Rp)
q_i : Commodity purchase quantity (kg)

Analysis of Factors Influencing Rural Household Consumption of Strategic Foods

The demand estimation model applied in this research is the Linear Approximation of the Almost Ideal Demand System (LA/AIDS) model. This model is a demand estimation approach that is derived from Marshallian demand but is proportional to expenditure (Iriany, A., Sui, J., Anindita, R., Khoiriyah, N., & Sa'diyah, A, 2022); (Nendissa, D. R., Anindita, R., Khoiriyah, N., & Sa'diyah, A. A, 2021). Each demand system consists of eleven model equations describing the eleven commodities analyzed (rice, corn, soybeans, shallot, chilies, poultry, eggs, red meat, sugar, cooking oil, and fish & sea food).

Model specification: The Linear Approximation of the Almost Ideal Demand System (LA-AIDS) model

The Linear Approximation of the Almost Ideal Demand System (LA/AIDS) model, introduced by Deaton and Muellbauer (Deaton & Muellbauer, 1980 ; Barnet & Seck, 2008). The LA-

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AIDS model is extensively utilized in empirical research. Although various alternative demand systems exist, it remains a favored choice due to its advantageous characteristics. These include perfect aggregation across consumers, a functional form that aligns with observed data, compliance with the axiom of choice, ease of estimation, and the capability to impose and test theoretical constraints such as adding-up, homogeneity, and symmetry on model parameters (Deaton & Muellbauer, 1980 ; Barnet & Seck, 2008). Following the specification provided by Deaton and Muellbauer (Deaton & Muellbauer, 1980 ; Barnet & Seck, 2008). The LA-AIDS model, utilized to analyze the strategic food demand of rural households in Indonesia, is formulated as follows:

$$\omega i = \alpha i + \sum_j Y\ ij\ lnPj + \beta_j ln\left[\frac{X}{P}\right] + \varepsilon_i \quad \text{.....} \quad (2)$$

The budget share (W_i) for the i^{th} strategic food group is calculated by dividing the expenditure on the ith strategic food group by the total expenditure on strategic food. The price of the j_{th} strategic food group is represented by p_j, while X signifies the total expenditure on strategic food. The white noise error term is denoted as epsilon (ε_i). The parameters to be estimated include α_i, β_i, and γ_{ij}. Furthermore, the LA-AIDS model defines an aggregate price index (P) as follows:

$$w_1 = a_{11} + y_{11}LnP_1 + y_{12}LnP_2 + y_{13}Lnp_3 + y_{14}LnP_4 + y_{15}LnP_5 + y_{16}Lnp_6 + \beta_1 Ln\left(\frac{X}{P}\right) + \delta_1 LnART \quad \text{.....} \quad (3)$$

where:

w_{1-11}	: Proportion of expenditure on the iiith food commodity
$P_1 - P_{11}$	: Prices of various food commodities, including rice, corn, soybeans, shallots, chilies, poultry, eggs, red meat, sugar, cooking oil, and fish & seafood
x	: Total expenditure on food consumption (Rp)
p *	: Stone price index, where ln $p^* = \Sigma\ w_i$. In p_i
μ	: Error term
α, d	: Intercep parameters
β	: Expenditure parameters
γ	: Price parameter
E xpd	: Household expenditure (Rp/month) (Rp/bulan)
i, j	: 1 (rice), 2 (corn), 3 (soybean), 4 (shallot), 5 (chillies), 6 (poultry), 7 (egg), 8 (red meat), 9 (sugar), 10 (cooking oil), dan 11 (fish & seafood)

Then, the formula for the proportion of expenditure (budget share) of each household for commodity group-i (wi) is:

$$w_i = \frac{\sum_{j=1}^{ji} e_j}{\sum_{i=1}^{j} ei} \quad \text{.....} \quad (4)$$

Deriving elasticities

Changes in demand can be measured through demand elasticity analysis, as variations in demand for a product are influenced by fluctuations in its price (own price elasticity), due to changes in consumer income (income elasticity), and as a result of changes in consumer income (income elasticity). As a result of changes in the prices of other commodities (cross elasticity). Demand elasticity can be analyzed using the Marshallian and Hicksian demand function approaches. However, this study only uses the Marshallian demand function because this function is used to measure

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changes in the quantity demanded due to changes in price, assuming the level of consumer satisfaction (utility) remains the same.. (Khoiriyah, N., Apriliawan, H., Maula, L. R., Sa'diyah, A. A., Forgenie, D., Susyanti, J., & Nendissa, D. R, 2024) I propose that elasticity can be calculated by using the following formula:

1. Marshallian elasticity, where there is an income effect derived from total expenditure, so that:

Marshallian price elasticity value:

$$\in_{ii}^{m} = -1 + \frac{\gamma_i}{w_i} - \beta_i$$

Marshallian cross elasticity values::

$$\in_{ij}^{m} = \frac{\gamma_{ij}}{w_i} - \beta_i \frac{w_j}{w_i}$$

2. Expenditure elasticity is obtained from: Expenditure elasticity is obtained from:

$$\eta_i = \frac{\partial\ log\ q_i}{\partial\ log\ x} = 1 + \left(\frac{1}{w_i}\right)\left(\frac{\partial w_i}{\partial \log x}\right) = 1 + \left(\frac{\beta_i}{w_i}\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5)$$

$\in_{ii}^{M}$: Marshallian price elasticity
$\in_{ij}^{M}$: Marshallian cross elasticity
η_i : Expenditure elasticity
w_i : budget share
γ_{i-j} : Parameters of price commodity
β_{i-j} : Parameters of expenditure
i : Commodity as dependent variables
j : Commodity as independent variables.

RESULT AND DISCUSSION

Analysis of Rural Household Expenditure Share on Strategic Commodities

The focus of research and policy development is gradually shifting. Initially centered on productivity at the farmer level, attention is now moving toward changes in food consumption demand and fluctuations in food prices. This study provides insight into the demand for strategic food for rural households in Indonesia by implementing the LA/AIDS system. In addition, it also provides an overview of rural household preferences for 11 strategic commodities in Indonesia. Preferences are described by the share of household expenditure. The share of rural household expenditure in Indonesia is influenced by 2 things, namely: the price and the amount of strategic food consumption (Sa'diyah, A. A., Anindita, R., Hanani, N., & Muhaimin, W, 2018). The results of the analysis of the share of rural household expenditure on strategic food are presented in Table 2.

Table 2. Share. of Rural House.hold E.xpe.nditure. in Indone.sia on Strate.gic Food

Commodity	Budget Share (%)	Average Consumption (Kg/hh)	Price (Rp/kg)
Rice	30,15	5.31	12,111.520
Corn	0,49	0.13	7,815.240
Soybean	0,01	0.00	0.000
Shallot	5,78	3.26	3,782.270
Chillies	4,75	0.25	40,028.280
Poultry	6,05	0.35	37,277.400
Egg	5,81	5.93	20,090.470

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Red meat	14,91	0.38	84,432.740
Sugar	4,42	5.40	1,744.800
Cooking Oil	6,78	0.82	17,710.650
Fish & Sea food	20,85	2.68	16,595.680

Sources: 2023 Susenas data, calculated

Table 2. shows the largest share of strategic food expenditure for rural households in Indonesia is rice (30.15%). Rural communities are highly dependent on rice as a staple food. Rice is a very important food commodity for rural communities in Indonesia, even becoming the main source of food in rural households. This phenomenon shows that government policies related to rice will affect politics and economic stability in Indonesia. So it is necessary to strive for a policy that can guarantee the availability of rice at all times at an affordable price (Fauzia, M. E., & Silalahi, E. B, 2022).

This research is in line with research conducted (Sari et al, 2024 ; Rusdiana & Maesya, 2017), which states that rice is a staple food. Table 2 shows that corn is the commodity that is least in demand by households throughout rural Indonesia. In fact, corn has the potential to be an alternative source of carbohydrates to replace rice. Meanwhile, the high share of fish expenditure (20.85%) shows that fish is an important source of protein for the Indonesian people. Fish is the most accessible animal protein source commodity for rural communities, compared to other protein sources (eggs, poultry, and ruminant meat).

Sugar is a food that is widely used by the community for food and beverage needs, reaching 5,400 kilograms per household. Almost all people consume sugar, especially granulated sugar. Sugar consumption in Indonesia in the last 5 years (2019-2023) shows an unstable trend, tending to decline with an average decline of 3.25% per year. In 2022, granulated sugar consumption per capita reached 6.32 kg per year, then decreased to 5.80 kg per capita per year in 2023 (Pusat Data dan Sistem Informasi Pertanian Sekretariat Jenderal Kementerian Pertanian, 2024). Although the need for sugar is not as large as other staple foods such as rice, because almost all households consume it, sugar is a very important commodity. Based on data from the trademap website, HS code 1710 (Cane or beet sugar and chemically pure sucrose, in solid form) for the period 2019-2023, Indonesia is very dependent on sugar imports (7.25%), so that sugar prices are greatly influenced by international market fluctuations. Therefore, the government needs to intervene by setting basic prices, import permits, and import duties (Mohamed, 2018; Rahman & Halkam, 2021)

Analysis of Factors Influencing Rural Household Consumption of Strategic Foods

Analysis of factors influencing rural household consumption of strategic food was conducted using the LA/AIDS model. The results of the analysis are presented in Table 3. The influence of each independent variable on the dependent variable is significant at the 10% level. Intercept shows the constant coefficient, beta for the expenditure coefficient, and gamma for the strategic food price coefficient. The results of the analysis show that the accumulation (alpha) is equal to 1. In addition, the accumulation of beta and gamma indicates zero (0). It can be concluded that the Adding up requirement (restriction) is met. The strategic food demand model for rural households in Indonesia is shown in Table 3. All models meet the assumptions of symmetry, homogeneity, and addition.

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Table 3 shows the results of the regression analysis of related commodity prices, other commodity prices, total expenditure (rice, corn, soybeans, shallot, chilies, poultry, eggs, red meat, sugar, cooking oil, and fish & sea food) statistically affecting the portion of food expenditure of rural households in Indonesia. This model is able to explain 90% of the variation in the portion of food expenditure (R^2 = 0.900). The results of the analysis show that the parameter coefficients of the commodity price variables related to the commodity groups of rice, chilies, poultry, ruminant meat, and fish are positive. This indicates that an increase in household income will increase the allocation of expenditure for these commodities. In line with research from (Kharisma, B., Alisjahbana, A. S., Remi, S. S., & Praditya, P, 2020) and (Sa'diyah, A. A., Anindita, R., Hanani, N., & Muhaimin, A. W, 2019) which shows that an increase in income will be followed by an increase in consumption of rice, chili, poultry, ruminant meat, and fish in both poor and non-poor households in rural areas. The increase in the price of rice, chili, poultry, red meat, and fish & sea food has a positive impact because it increases the value of expenditure for these commodities. This is due to the proportion of price increase being greater than the decrease in consumption (Wardhani, 2017 ; Nikmatul, 2020). However, the increase in the price of red meat actually reduces the consumption of red meat (Ilham, N, 2009), according to research (Handayani, S., Fariyanti, A., & Nurmalina, R, 2016).

Table 3. Factors Influencing Rural Household Consumption of Strategic Foods

	Dependent Variable										
Independent Variables	**Rice**	**Corn**	**Soybean**	**Shallot**	**Chillies**	**Poultry**	**Egg**	**Red meat**	**Sugar**	**Cooking oil**	**Fish & Sea food**
Intercept	1.190*	-0.041*	-0.066*	-0.132*	0.043*	0.273*	-0.173*	0.156*	-0.431*	-0.260*	0.441*
Price of rice	-0.136*	0.004*	0.000*	0.002*	0.029*	0.058*	0.028*	0.005*	-0.032*	-0.013*	0.055*
Price of corn	0.004*	-0.037*	0.002*	0.000*	0.002*	0.012*	0.003*	0.010*	-0.001*	0.005*	0.000*
Price of soybean	0.000*	0.002*	-0.057*	0.000*	0.000*	0.004*	0.000*	0.051*	0.000*	0.000*	0.000*
Price of shallot	0.002*	0.000*	0.000*	0.007*	-0.007*	0.001*	0.008*	-0.001*	0.014*	0.001*	-0.025*
Price of chillies	0.029*	0.002*	0.000*	-0.007*	-0.011*	0.006*	-0.006*	0.001*	0.001*	-0.014*	-0.001*
Price of poultry	0.058*	0.012*	0.004*	0.001*	0.006*	-0.100*	0.007*	0.020*	-0.002*	-0.014*	0.009*
Price og egg	0.028*	0.003*	0.000*	0.008*	-0.006*	0.007*	-0.036*	0.000*	0.017*	-0.001*	-0.020*
Price of red meat	0.005*	0.010*	0.051*	-0.001*	0.001*	0.020*	0.000*	-0.086*	-0.001*	-0.002*	0.002*
Price of sugar	-0.032*	-0.001*	0.000*	0.014*	0.001*	-0.002*	0.017*	-0.001*	0.025*	0.021*	-0.043*
Price of cooking oil	-0.013*	0.005*	0.000*	0.001*	-0.014*	-0.014*	-0.001*	-0.002*	0.021*	0.052*	-0.034*
Price of fish & sea food	0.055*	0.000*	0.000*	-0.025*	-0.001*	0.009*	-0.020*	0.002*	-0.043*	-0.034*	0.058*
Total Expenditure	0.099*	-0.003*	-0.005*	-0.011*	0.004*	0.023*	-0.014*	0.013*	-0.036*	-0.022*	0.037*
R^2						0.900					

Sources: 2023 Susenas data, calculated
Note: *) significant at the 90% confidence level

The coefficients of other commodity prices vary, with some positive and others negative (Table 3). Other commodity variables with a negative sign mean that an increase in the price of the commodity will reduce the portion of expenditure for the commodity being analyzed. Conversely, if the value of the other commodity variable is positive, the increase in the price will increase the portion of expenditure for the commodity being analyzed (Umaroh, R., & Vinantia, A, 2018). The increase

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in the price of soybeans, sugar and cooking oil will reduce the portion of rice expenditure. The increase in the price of sugar will reduce the portion of corn expenditure. While the increase in the price of rice will increase the portion of corn expenditure even though the value is very small. This condition illustrates that in rural households in Indonesia, rice and corn are still substitute commodities. The average household expenditure on food in rural Indonesia is IDR 421.2 thousand/capita/month. This condition causes if there is an increase in the price of soybeans, sugar and cooking oil, then households must reduce rice consumption, so that all the basic food ingredients needed can be purchased. The total expenditure variable has a negative value for the commodities of corn, soybeans, shallot, eggs, sugar, and cooking oil, with values of -0.003, 0.005, 0.011, 0.014, 0.036, and 0.022, respectively. The negative sign indicates that if rural household expenditure increases by 1 percent, the proportion of expenditure on corn, soybeans, shallot, eggs, sugar, and cooking oil decreases by 0.003%, 0.005%, 0.011%, 0.014%, 0.036%, and 0.022%. This finding is in line with the findings (Aryaputra & Ferichani, 2024 ; Sa'diyah et al, 2019). On the other hand, the coefficients for expenditure on rice, chilies, poultry, red meat and fish & sea food have positive values, which means that if there is an increase in household expenditure, the amount of consumption will also increase

Analysis of Strategic Food Income Elasticity

The estimated results of the total expenditure and price coefficients are then used to calculate the value of expenditure elasticity, own price elasticity and cross price elasticity. The value of expenditure elasticity for all strategic commodities of Indonesia (rice, corn, soybeans, shallot, chilies, poultry, poultry, red meat, sugar, cooking oil, and fish & sea food) is positive. The positive sign indicates that strategic food in Indonesia is a nececities commodity. This supports the results of the study. (Nakelse et al, 2017 ; Mwenjeri et al, 2016), that the elasticity of food expenditure in Laikipia City, Kenya is positive

Cooking oil is a strategic commodity in Indonesia with the lowest expenditure elasticity value, which is 0.287. Cooking oil is a strategic commodity that is inelastic to changes in rural household expenditure. Cooking oil is a basic ingredient in most household dishes in Indonesia. Traditional dishes and everyday foods such as fried foods, stir-fries, or coconut milk dishes are highly dependent on the use of cooking oil. Because of the importance of cooking oil in Indonesian cuisine, households continue to buy it even though the price has increased, making this commodity inelastic. In addition, cooking oil is difficult to replace with other affordable ingredients. Although there are alternatives such as olive oil, it is more expensive and is not commonly used for everyday cooking by most rural communities. This makes rural households tend to continue to use cooking oil even though the price has increased (Aulia & Yuliana, 2024).

Red meat (beef, goat meat, and lamb) is a strategic food group in Indonesia with expenditure elasticity values of 2.297; 2.123; 2.461 for Indonesian households, urban households, and rural households, respectively. If there is an increase in Indonesian household expenditure, urban and rural by 1%, it will increase household consumption of red meat by 2.46%; 2.123%; 2.461%. Red meat is a strategic commodity with the highest elasticity. Red meat is often considered a superior good in the context of consumption in Indonesia, meaning that demand increases with increasing income. Consumers in Indonesia generally consume red meat in larger quantities when they have more money, while consumption decreases when income decreases. Beef, for example, is considered a more luxurious food compared to other protein sources such as chicken or fish. Red meat, especially beef,

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has a much higher price compared to other protein sources such as chicken or fish. Because the price is relatively expensive, consumers tend to be very sensitive to price changes. If prices increase, consumers may reduce consumption or switch to cheaper alternatives. Conversely, if prices decrease or there is a promotion, demand tends to increase significantly. In Indonesia, consumers have many more affordable protein options, such as chicken, fish, and eggs. When the price of red meat increases or income decreases, consumers tend to switch to these alternatives. This shows that red meat has many substitutes, so its demand is more elastic because it is easily replaced by other protein sources (Henchion et al, 2014 ; Forgenie et al, 2023).

Table 4. Expenditure Elasticity

Commodity	Expenditure Elasticity
Rice	1.094
Corn	1.122
Soybean	1.336
Shallot	0.730
Chillies	1.079
Poultry	1.454
Egg	0.728
Red meat	2.461
Sugar	0.207
Cooking Oil	0.636
Fish & Sea food	1.268

Sources: 2023 Susenas data, calculated

Red meat has the highest expenditure elasticity value (2.461) among rural households, making it the most responsive commodity to income changes. A one percent increase in rural household income results in a 2.461 percent rise in beef consumption. Since the income elasticity value for beef exceeds one, it indicates that beef is considered a luxury item for rural households (Miranti, & Syaukat, 2016 ; Anindita et al, 2019).

Strategic Food Price Elasticity Analysis

Marshallian elasticity refers to the concept of elasticity of demand as measured by changes in price and quantity demanded or supplied. Specifically, Marshallian elasticity of demand measures how much the quantity demanded of a good changes in response to a change in the price of that good, assuming that consumer income and the prices of other goods remain constant (Raziqi, A., & Masruroh, N, 2019). The results of the Marshallian price elasticity analysis are presented in Table 5. All price elasticities themselves are negative. The price elasticity value is less than one for the commodities of onions, cooking oil, and fish. This value indicates that onions, cooking oil, and fish are inelastic commodities. An interesting finding is that the price elasticity value of rice is greater than one (elastic). The findings show that rural households often have access to various alternative food sources such as corn, sweet potatoes, cassava, or sago. If the price of rice increases, they can easily switch to other staple foods, so that the demand for rice becomes more elastic. Many households in rural areas are also farmers and have their own rice stock. When the price of rice increases, they may reduce purchases from the market and rely more on their own harvest or look for other alternatives. Rural household incomes tend to be lower than urban ones. Increases in rice prices

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can make them more sensitive to price changes and encourage them to look for cheaper alternatives or reduce rice consumption significantly. In rural areas, food consumption is more flexible than in urban areas.

Table 5. Strategic Food Price Elasticity

Commodity	Rice	Corn	Soybean	Shallot	Chillies	Poultry	Egg	Red meat	Sugar	Cooking oil	Fish & sea food
Beras	**-1.801*****	0.648***	10.004	0.364***	0.531***	1.052***	0.589***	-22.482	0.434***	0.281***	0.092***
Jagung	0.008	**-9.353*****	59.244	0.006	0.042	0.312***	0.034	-105.031	-0.004	0.044***	-0.002
Kedelai	0.001	0.447	**-17.365**	0.001	0.002	0.095	0.004	-552.879	-0.001	-0.002	-0.001
Bawang	0.049***	0.091*	2.87	**-0.967*****	-0.134***	0.085***	0.055***	5.248	0.057***	-0.038***	-0.122***
Cabai	0.073***	0.524***	3.789	-0.059***	**-1.196*****	0.138***	-0.050***	-8.757	0.046***	-0.104***	-0.018**
Daging Unggas	0.127***	2.686***	108.246	0.061***	0.110***	**-3.731*****	0.113***	-210.029	0.091***	-0.066***	0.019
Telur	0.114***	0.674***	13.451	0.056***	-0.103***	0.212***	**-1.419*****	-7.429	0.111***	-0.038***	-0.098***
Daging Ruminansia	0.009	2.215***	1541.95	-0.002	0.017	0.518***	0.01	**-27.418**	0.007	-0.006	0.006
Gula	0.037***	-0.169***	-2.049	0.022***	0.017**	0.135***	0.082***	-4.902	**-1.023*****	0.037***	-0.169***
Minyak Goreng	0.023**	1.125***	-6.289	-0.050***	-0.258***	-0.298***	-0.060***	11.17	0.079***	**-0.622*****	-0.159***
Ikan	0.027***	-0.059**	-0.55	-0.127***	-0.019***	0.045***	-0.106***	-6.517	-0.139***	-0.139***	**-0.75**

Source.s: 2023 Suse.nas data, calculate.d
* p<0.1, ** p<0.05, *** p<0.01. Signican le.ve.l

Households can reduce rice consumption and replace it with other foods that are cheaper or available locally. The results of the analysis of strategic food price elasticity show that the ruminant meat group consisting of beef, goat meat, and lamb is the strategic food group that is most responsive to price changes. The elasticity value of -27.418 shows that when there is a 1 percent increase in price, there will be a decrease in consumption of 27.418 percent. Which means that ruminant meat is a luxury item for rural households. This is in line with the results of the study (Bilgic & Yen, 2013).
The Marshallian cross-price elasticity analysis indicates that rice exhibits a complementary relationship with all other strategic food commodities, including corn, soybeans, onions, chilies, poultry, eggs, ruminant meat, oil, and fish. An increase in rice prices will lead rural households to reduce rice consumption while maintaining their intake of other commodities.

CONCLUSION AND SUGGESTION

The highest share of rural household expenditure is for rice, which means that rice is the most preferred strategic food by rural households in Indonesia. The share of expenditure for strategic food is influenced by the price of related strategic food, the price of other strategic food, and total expenditure which is statistically significant. All expenditure elasticities are positive with varying values of less than one and more than one. All uncompensated price elasticity values are negative with absolute varying values of less than one to more than one. This phenomenon shows that all strategic food is a basic need commodity for rural households. that strategic food has a varying relationship of substitution and complementarity. Because rice is the most preferred strategic food by rural households, the government needs to ensure its availability and affordability through price stabilization policies, subsidies, or increasing domestic production to reduce dependence on imports. The share of expenditure for strategic food influenced by the price of related food and total expenditure shows that price changes can have a significant impact on rural household consumption patterns. Therefore, policies to control food inflation must be a primary concern. The National Food Agency (Bapenas) together with the Ministry of Trade need to establish a policy on the Highest Retail

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Price (HET) which is evaluated periodically, in addition the Government needs to implement tiered HET for rice quality (premium, medium, and rice for government programs) so that market distortion does not occur.

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