ANALYSIS FOOD DEMAND OF JAVA HOUSEHOLDS WITH AIDS MODEL ESTIMATES

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Abstract

The quantity and quality of food consumed by the community are determined by the price level and household income. Household food expenditure share is still dominated by rice commodities. The aims of this study are 1) to analyse the level of household expenditure, the expenditure elasticity and price elasticity of household food demand in Java. The data used was March 2015, 2016, and 2017 SUSENAS data. Household consumption data was estimated using the AIDS Model. The results showed that household food expenditure share for medium and low-income groups was more than 50 percent. This shows that the household is food insecure. The own-price elasticity for all commodities is negative and inelastic. Changes in food prices do not significantly affect changes in demand for food commodities because their elasticity is inelastic. Household food demand is more influenced by food prices than household income for food commodities except for rice commodities. Rice has elastic expenditure elasticity. The relationship between each commodity is almost entirely negative (complementary). Recommendations need a policy on food price control. Suggestions for further research is that it is necessary to conduct research on changes in food demand based on the level of classification of household income groups.

Keywords: Demand; rice; own-price elasticity; AIDS Model dan expenditure.

Abstrak

Kuantitas dan kualitas pangan yang dikonsumsi oleh masyarakat ditentukan oleh tingkat harga dan pendapatan rumahtangga. Pangsa pengeluaran pangan pokok masih didominasi oleh komoditas beras. Tujuan dari penelitian ini adalah 1) menganalisis tingkat pangsa pengeluaran rumah tangga terhadap pangan di Pulau Jawa dan (2) menganalisis elastisitas pengeluaran dan elastisitas harga dalam permintaan pangan rumah tangga di Pulau Jawa. Data yang digunakan adalah data SUSENAS Maret 2015, 2016 dan 2017. Data konsumsi rumah tangga di estimasi dengan menggunakan AIDS Model. Hasil penelitian menunjukkan bahwa pangsa pengeluaran pangan rumah tangga golongan pendapatan sedang dan rendah (Q3 dan Q4) untuk daerah perkotaan dan perdesaan lebih dari 50 persen. Ini menunjukkan bahwa rumah tangga tersebut rawan pangan. Elastisitas harga sendiri untuk semua

komoditas bernilai negative dan bersifat inelastis. Perubahan harga pangan tidak mempengaruhi perubahan permintaan komoditi pangan secara signifikan karena elastisitasnya inelastis. Permintaan pangan rumahtangga lebih dipengaruhi oleh harga pangan dari pada pendapatan rumah tangga untuk komoditi pangan kecuali komoditi beras. Beras memiliki elastisitas pengeluaran yang elastis (artinya permintaan pangan sangat responsif terhadap perubahan pengeluaran/pendapatan rumah tangga. Hubungan setiap komoditas hampir secara keseluruhan bertanda negatif (komplementer). Rekomendasi perlu adanya kebijakan tentang pengawasan harga pangan, karena harga pangan lebih berpengaruh terhadap permintaan pangan. Saran penelitian selanjutnya adalah perlu dilakukan penelitian tentang perubahan permintaan pangan berdasarkan tingkat klasifikasi golongan pendapatan rumah tangga.
***Kata kunci**: Permintaan; beras; elastisitas harga sendiri; model AIDS dan pengeluaran.*

INTRODUCTION

The proportion of Indonesian people's food expenditure is relatively higher than the proportion of non-food expenditure. According to the 2018 BPS, the share of population food expenditure in rural areas is 56.28 percent while urban areas are 45.98 percent. Fulfillment of primary needs both food and non-food related to poverty (Nicholson, 1995). Thus, the proportion of food expenditure to all household expenditures can be used as an indicator of poverty. The higher the welfare of the people of a country, the share of food expenditure of its population will be smaller and vice versa (Deaton & Muellbauer, 1980). Thus, the share of food expenditure to all household expenditures can be used as an indicator of poverty. The higher the welfare of the people of a country, the proportion of food expenditure of its population will be smaller and vice versa (Deaton & Muellbauer, 1980).

The level of quantity and quality of food consumed by the community is determined by the level of food prices and household income. Some researchers assume that household expenditure is a proxy for household income, so this shows that the higher the household income, the higher the food security of the household. The average quality of food consumption in Indonesia is still low and less diversified, still dominated by food sources

of carbohydrates, especially from grains (Rachman & Ariani, 2016).

Based on the food security and vulnerability Atlas (FSVA) map in 2018, there were 81 districts vulnerable to food insecurity. Badan Ketahanan Pangan Kementerian Pertanian (2018) that food expenditure is a good proxy for permanent income, it is also an important indicator of chronic malnutrition in the long term. The higher people well-being of a country, the lower the share of food expenditure of the population and vice versa (Deaton & Muellbauer, 1980).

According to SUSENAS data from March 2017, the percentage of households in Indonesia that have a proportion of food expenditure to total expenditure in the poor category (more than 65%) is 33.55%. The province of East Nusa Tenggara has the largest percentage of households with a proportion of food expenditure of more than 65%, namely 55.76%, Aceh 48.26%, and Papua 44.08%. The high percentage of households with a large proportion of food expenditure indicates that the level of community welfare is relatively low. Differences in the structure of the economy, agriculture, and economic development in each province will cause differences in households to diversify food which can be seen between types of regions (urban and rural), and between groups/strata of household income. This

difference will cause differences in income levels, food price levels, thus causing differences in household consumption patterns. In addition, studying food consumption patterns to find out what types of food are not consumed by the rich household but are consumed by the poor household can be useful for formulating food policies. This intervention is designed to increase the consumption of the poor and more efficiently, more food is consumed per unit of Rupiah by the poor, because the intervention commodities are only consumed by the target group (Timmer, 2004).

An increase in prices can lead consumers to reduce their consumption or change the composition of food (Anríquez et al., 2010). Thus the results of the study indicated that the right solution to improve consumer welfare is to switch to other food consumption or food diversification. However, the notion of food diversification in Indonesia is biased towards staple foods (generally a source of carbohydrates), so that government policies and programs are weak and limited to basic food diversification only (Ariani, 2010). The objectives achieved from this research are: (1) analysing the level of household expenditure on food in Java and (2) analysing the expenditure elasticity and price elasticity in household food demand in Java.

LITERATURE REVIEW
Security Food Condition in Indonesia

The results of the Global Food Security Index (GFSI) analysis show Indonesia's Food Security index ranking in 2015 ranking 74, 2016 ranking 71, 2017 ranking 69, 2018 ranking 65, 2019 ranking 62, and 2020 ranking 69 out of 113 countries with a score of 48.36/100 (The Economist Intelligence (EIU), 2015, 2016, 2017, 2018, 2019). The score shows that Indonesia still has to improve its food conditions so that people are protected from food insecurity. The quality of food

consumption in Indonesia is still low and is still dominated by carbohydrates from grains (Rachman & Ariani, 2016). This shows that food diversification is still low. The low diversification of food will make staple food concentrated on only one commodity, namely rice.

The dependence on rice which is still high among the people and the increasing consumption of noodles (which are made from wheat and flour are all imported ingredients) significantly make efforts to diversify food consumption not show success and are even misguided (Ariani & Ashari, 2016). According to Ariani and Ashari (2016), the factors that constrain food consumption diversification are (1) rice is more nutritious and easy to process, (2) the concept of eating, where people have the concept of "feeling they haven't eaten if they haven't eaten rice", (3) rice as a source of superior food commodities, (4) The availability of rice is abundant and the price of rice is cheap, (5) household income is still low, (6) non-rice food processing technology and its promotion are still limited, (7) overlapping policies, where policies from the past reduce rice consumption but rice prices were also lowered, and (8) wheat import policy, many types of product development and intensive promotion.

According to Sudaryanto et al. (2000) there are still weaknesses in food policies so far where the objectives and implementation are directed primarily at political and economic stability, whereas this goal should be directed at achieving sustainable food security where there is guaranteed availability of rice (staple foods of the population) at a level of affordable price.

The Relationship Between the consumption Food with food's price

Rice prices and household food diversification in Bangladesh have a relationship (Torlesse et al., 2003). Rice is the main staple food in Bangladesh, the

price of which fluctuates due to harvest season, weather conditions, and government policies. When the price of rice decreases, households will continue to consume a fixed amount of rice, so their spending on rice will decrease. This causes households to spend more money on non-rice food, so they consume non-rice food more often and diversify their nutrition.

One of the results of the study showed the difference between households in rural and urban areas in diversifying food when there was a change in food prices (Matz et al., 2015). The results show that households in urban areas will increase their consumption of sugar and vegetables or decrease their consumption of dairy products and fruits when grain prices increase. Meanwhile, households in rural areas will diversify their nutrition with food that they do not normally consume, where the food has a relatively cheaper price than teff (the staple food of the Ethiopian people). In addition, households that are net sellers will benefit from increased food prices, namely an increase in income so they are able to diversify their food with more expensive/luxury foods, and conversely, households that are net buyers will experience a decrease in real income so they have to consume cheaper food.

Studies on the Demand Elasticity and Food Price Relationship

The results of another study conducted on "Dynamic Food Demand in Urban China" (Zhou et al., 2014). The study shows that most of the main food products are inelastic to price changes in urban areas. We also find that dynamic models tend to produce relatively small expenditure elasticity values compared to static models.

If there is an increase in prices, the demand for these goods will decrease and will be substituted with other goods (Pindyck & Rubinfeld, 2013). Research results in Pakistan state that wheat and rice

are complementary goods (Farooq et al., 1999). The elasticity between rice and wheat is different, where the elasticity of the price itself for wheat is more elastic than for rice. This means that consumers are more responsive to changes in the price of wheat compared to rice. Commodities of meat and other animal products are substitutes or substitutes for each other. An increase in household income will increase the consumption of legumes. Changes in commodity prices of rice, wheat, nuts, milk, and meat affect household consumption patterns.

There have been many studies on the impact of rising food prices on welfare. Conducted a study on the impact of changes in food price increases on welfare where the researchers separated consumers into 2 groups, namely consumers who work as farmers and consumers who are non-farmers (Arndt et al., 2008). The results of the study indicate that the increase in food prices has an impact on the increase in poverty in Mozambique. An increase in food prices will increase rural incomes by 1 percent while reducing urban incomes by 2.2 percent.

Aftab et al. 2017 conducted a study on the impact of rising food prices on surplus consumers in 3 South Asian countries, namely Pakistan, India and Bangladesh using Compensating Variations from the LA/AIDS model. The results show that the self-price elasticity of cereal commodities (wheat and rice) is inelastic. However, protein commodities (chicken and mutton) are relatively more elastic. Thus, the increase in staple food prices will reduce the level of welfare and increase the percentage of poor people in the country. Because the share of food expenditure compares to total expenditure is high.

The results of the study Suriani et al. (2018) on the analysis of the elasticity of demand for rice by the poor in Aceh using the LA/AIDS model approach. The purpose of this study is to analyze the impact of the Raskin subsidy policy. The

commodities studied were Raskin, non-Raskin rice, meat, fish, milk, and eggs. The largest pro proportion of respondents' expenditure was allocated for rice consumption and the least for milk consumption. The results of the study indicated that the factors that significantly affect the expenditure of poor households are the number of dependents, income, and aggregate expenditure.
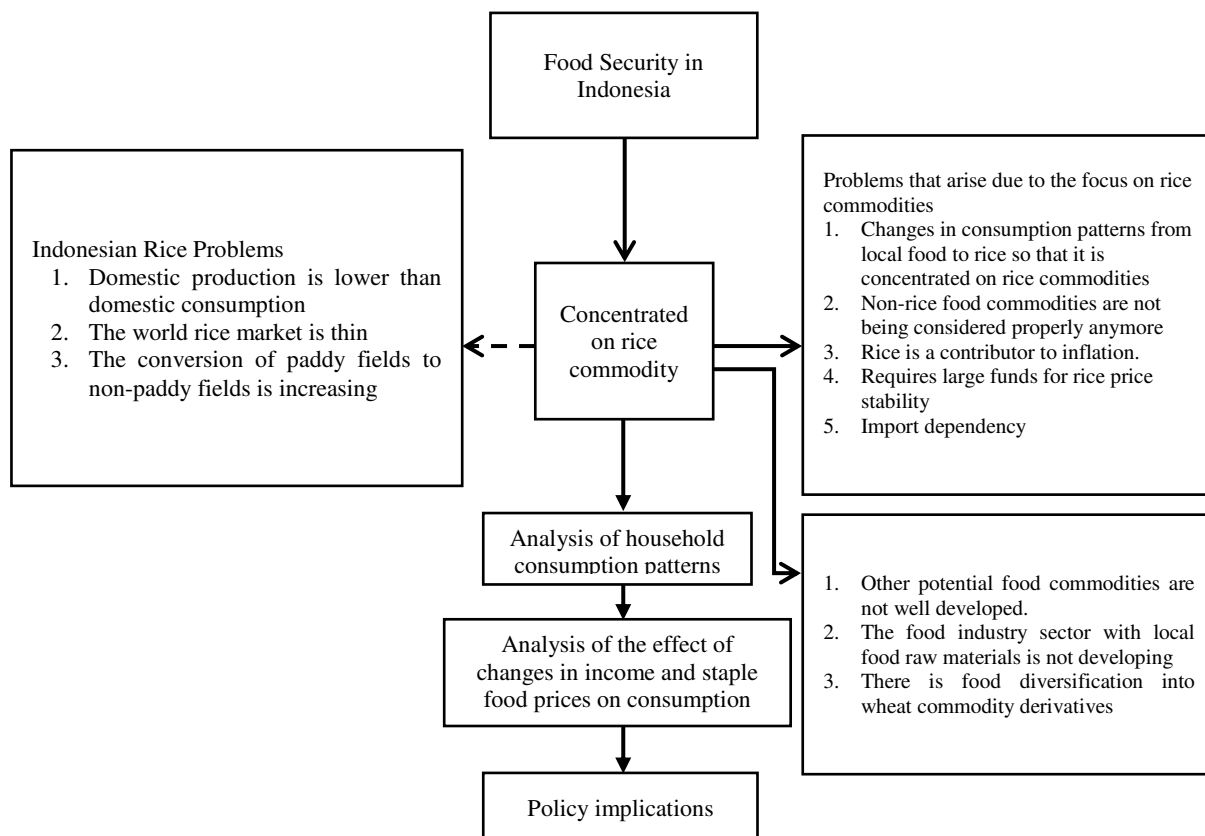

Figure 1. Framework

RESEARCH METHODS

This study used 3 periods of SUSENAS data in Java, they are data on March 2015, March 2016, and March 2017. Respondents were divided into 4 groups based on income group. Badan Pusat Statistik (BPS) distinguishes the income per capita of the population into 4 categories: 1) very high-income group, namely Q1 (average income per capita/month is more than Rp. 3,500,000), 2) high income group, namely Q2 (average) average income per capita/month is Rp. 3,500,000.00 to Rp. 2,500,000.00), 3) the medium income group is Q3 (average income per capita/month is Rp. 2,500,000.00 to Rp. 1,500,000.00), and 4) low income group, namely Q4 (average income per capita/month is less than Rp. 1,500,000). The data used staple food data. The data were grouped into 12 groups, namely W1 (rice), W2 (corn), W3 (wheat flour), W4 (cassava), W5 (yam), W6 (fish), W7 (meat), W8 (eggs), W9 (vegetables), W10 (beans), W11 (fruits), and W12 (instant noodles).

This research used the Almost Ideal Demand System (LA/AIDS) linear model. Based on the PIGLOG class, the LA/AIDS cost function can be obtained, namely:

$$logc(u,p) = \alpha_0 + \sum_k \alpha_k\, logp_k + \frac{1}{2}\sum_k \sum_j y *_{jk} logp_k logp_j + u\beta_0 \Pi_k p_k^{\beta k}$$

$$(1)$$

Based on equation (1) it can be easily seen that c (u, p) is linearly homogeneous at p. The demand function can be derived directly from equation (1). The price derivative of the cost function is the quantity demanded, which when multiplied by pi/c (u, p) will produce wi, the budget share of commodity i, as follows:

$$\frac{\partial logc(u,p)}{\partial logp_i} = \frac{p_i q_i}{c(u,p)} = w_i \qquad (2)$$

The logarithmic differentiation of equation (1) makes the budget share a function of price and utility:

$$w_i = \alpha_i + \sum_j \gamma_{ij} \log(p_j) + \beta_i u \beta_0 \Pi_k p_k^{\beta_k} \qquad (3)$$

Where $\gamma_{ij} = \frac{1}{2}(\gamma_{ij}^* + \gamma_{ji}^*)$.

The total expenditure x is equal to c (u, p) so that the consumer can maximize his utility, and the equation can be inverted to give u as a function of p and x, an indirect utility function. These results in a demand function for the LA/AIDS model in the form of a budget share, namely:

$$w_i = \alpha_i + \sum_j \gamma_{ij} \log(p_j) + \beta_i log\left\{\frac{x}{p}\right\} \qquad (4)$$

Where:
wi   = Budget share of goods i
pj   = Price of goods j
x   = Total food expenditure
p   = price index
i, i, ij =   Intercept   parameters,   total
            expenditure, and aggregate price

The price index P is defined as:

$$logP = \sum_i w_i \log(p_i) \qquad (5)$$

The limitations given to the parameters of the LA/AIDS model equation (Equation 1) are:

$$\sum_{i=1}^{n} \alpha_i = 1; \qquad \sum_{i=1}^{n} \gamma_{ij} = 0;$$

$$\sum_{i=1}^{n} \beta_i = 0; \quad \sum_{j} \gamma_{ij} = 0;$$

$$\gamma_{ij} = \gamma_{ji}$$

If the restriction is imposed, then equation (4) will describe the demand system function which adds up to the total expenditure (Σwi=1) homogeneous degree zero on the price and total expenditure is taken together, and which satisfies the Slutsky symmetry.

This study estimated the parameters of the AIDS linear model using the Seemingly Unrelated Regression (SUR) method. This is because the estimation results from the SUR method are more efficient than the estimation results from the OLS method. If the cross-equation error covariances are zero, then the OLS and SUR estimates are equivalent. If the cross-equation error covariances are not zero, then the SUR estimation parameter has a smaller standard error than the OLS estimation parameter.

Parameter estimation results can be biased due to selectivity bias and simultaneity bias, quality effect, and quantity effect. Selectivity bias occurs due to households that do not consume one particular food commodity. This can be overcome by adding the independent variable Inverse Mills Ratio (IMR) to the main model. The formula for calculating elasticity using the parameters of the AIDS estimation results are:

Price Elasticity is

$$e_{ii} = \frac{\gamma_{ii} - \beta_i w_i}{w_i} - 1 \qquad (6)$$

Cross Elasticity is

$$e_{ij} = \frac{\gamma_{ij} - \beta_i w_j}{w_i} - 1; i \neq j \qquad (7)$$

The Expenditure Elasticity is

$$\eta_i = 1 + \frac{\beta_i}{w_i} \qquad (8)$$

The expenditure elasticity in equation (8) is the elasticity of demand for each food commodity to the total food expenditure of a certain number of commodities, not to total household expenditure.

RESULT AND DISCUSSION
Households Expenditure Patterns in Java 2015 – 2017

The proportion of household food expenditure of respondents in Java and Indonesia in 2015 – 2017 is in **Table 1**. The average monthly income of households in Java in general in 2015, 2016, and 2017 is higher than the national average. However, when compared based on the type of region and the share of household food expenditure per capita on the island of Java, the share of food expenditure is greater than the national average. The average household expenditure in Java is higher than the national average, but the share of food expenditure is also larger than the national average. The share of food expenditure in Java is 54.32 percent (2015), 53.82 percent (2016), and 55.85 percent (2017). The share of food expenditure in rural areas is higher than in urban areas, meaning that the level of welfare in urban areas is greater than in rural areas. The higher the food expenditure proportion in a household, the lower will be the budget allocation for income (expenditures) for housing, education, health, and other non-food items.

The average proportion of food expenditure in Java for urban areas has increased at an average rate of 0.91 percent (urban) and 0.61 percent (rural). This means that the pro proportion of food expenditure for each household has increased. **Table 1** shows that in 2015 the expenditure was greater than in 2016, and 2017. This is presumably due to an increase in prices or inflation due to the change in the fuel subsidy scheme in early 2015, the change in the scheme resulted in a significant and temporary increase in prices, thus affecting effective income and causing expenditure increases (Miranti et al., 2016).

The data was processed based on the monthly per capita income group, the group that has a share of food expenditure above 60.00 percent in the Q4 group or the income is less than Rp. 1,500,000.00 (**Table 2**.). This shows that the Q4 group is food vulnerable if there is an increase in food prices. The greater the income or household income, the smaller the share of food expenditure (Engel's law), and this is following **Table 2**. where the Q1 and Q2 groups share food expenditure below 50.00 percent.

Table 1. Monthly Average Per Capita Expenditure Per Capita (Rupiahs) by Commodity Group in Java and Indonesia, March 2015, March 2016, and March 2017

Type of Expenditure		2015			2016			2017		
		Perkotaan	Rural	Urban+Rural	Urban	Rural	Urban+Rural	Urban	Rural	Urban+Rural
Jawa	food (Rp)	1,160,858	540,527	955,569	639,212	387,222	474,369	701,593	436,623	519,298
	(%)	50.74	59.54	54.32	50.66	58.43	53.82	52.56	60.75	55.85
	non food (Rp)	1,126,769	445,247	801,432	622,557	327,176	565,212	633,156	344,660	592,663
	(%)	49.26	40.46	45.68	49.34	41.57	46.18	47.44	39.25	44.15
	Total (Rp)	2,287,856	985,774	1,759,147	1,261,769	714,398	1,039,581	1,334,749	781,282	1,111,961
	(%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Indonesia	food (Rp)	457,312	366,834	412,462	520,631	397,100	460,639	590,082	457,927	527,956
	(%)	42.55	55.63	47.47	44.57	55.83	48.68	46.70	58.66	50.94
	non food (Rp)	617,352	292,580	456,361	647,500	314,166	484,619	673,444	322,666	508,541
	(%)	57.45	44.37	52.53	55.43	44.17	51.32	53.30	41.34	49.06
	Total (Rp)	1,074,664	659,414	868,823	1,168,131	711,266	945,258	1,263,526	780,593	1,036,497
	(%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Sources: BPS (2015, 2016, dan 2017)

Table 2. Monthly Average Per Capita Expenditure Per Capita (Rupiahs) by Level of Expenditure in Java and Indonesia, March 2015, March 2016 and March 2017

| Level of Expenditure		2015			2016			2017		
		Urban	Rural	Urban+Rural	Urban	Rural	Urban+Rural	Urban	Rural	Urban+Rural
Q1	food (Rp)	2,566,800.00	2,369,132.00	2,543,305.00	1,311,472.00	891,520.90	1,287,063.00	1,262,370.00	975,588.90	1,243,328.00
	(%)	38.50	45.32	39.31	25.67	18.64	25.26	25.22	20.76	24.92
	non food (Rp)	5,445,227.00	3,256,117.00	5,185,029.00	4,256,793.00	4,187,523.00	4,252,766.00	4,280,015.00	4,160,905.00	4,272,106.00
	(%)	61.50	54.67	60.69	74.33	81.36	74.74	74.78	79.24	75.08
	Total (Rp)	8,012,027.00	5,625,249.00	7,728,334.00	5,568,265.00	5,079,043.90	5,539,829.00	5,542,385.00	5,136,493.90	5,515,434.00
	(%)	100.00	99.99	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Q2	food (Rp)	1,400,880.00	1,612,592.00	1,450,320.00	1,040,142.00	933,549.00	1,025,561.00	1,050,376.00	946,854.40	1,040,416.00
	(%)	47.35	55.26	49.20	36.14	33.19	35.74	36.20	32.95	35.87
	non food (Rp)	1,562,531.00	1,312,227.00	1,504,079.00	1,854,017.00	1,900,974.00	1,860,441.00	1,864,384.00	1,940,139.00	1,871,673.00
	(%)	52.65	44.74	50.80	63.86	66.81	64.26	63.80	67.05	64.13
	Total (Rp)	2,963,411.00	2,924,819.00	2,954,399.00	2,894,159.00	2,834,523.00	2,886,002.00	2,914,760.00	2,886,993.40	2,912,089.00
	(%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Q3	food (Rp)	925,051.40	1,101,727.00	975,982.30	806,188.20	841,857.60	822,858.90	844,535.50	837,460.80	843,277.90
	(%)	47.88	56.91	50.47	57.00	44.65	43.26	44.65	46.36	44.94
	non food (Rp)	1,006,379.00	830,410.30	955,652.00	1,085,638.00	1,058,003.00	1,081,244.00	1,062,618.00	989,364.80	1,049,597.00
	(%)	52.12	43.09	49.53	43.00	55.35	56.74	55.35	53.64	55.06
	Total (Rp)	1,931,430.40	1,932,137.30	1,931,634.30	1,891,826.20	1,899,860.60	1,904,102.90	1,907,153.50	1,826,825.60	1,892,874.90
	(%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Q4	food (Rp)	381,877.90	359,311.20	370,815.80	396,233.80	358,332.70	378,741.50	420,269.80	404,544.20	412,930.00
	(%)	55.34	60.57	57.91	54.77	59.51	56.96	57.83	62.12	59.83
	non food (Rp)	335,051.80	255,129.40	295,874.00	351,064.50	258,481.70	308,335.20	336,122.20	267,553.30	304,118.00
	(%)	44.66	39.43	42.09	45.23	40.49	43.04	42.17	37.88	40.17
	Total (Rp)	716,929.70	614,440.60	666,689.80	747,298.30	616,814.40	687,076.70	756,392.00	672,097.50	717,048.00
	(%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
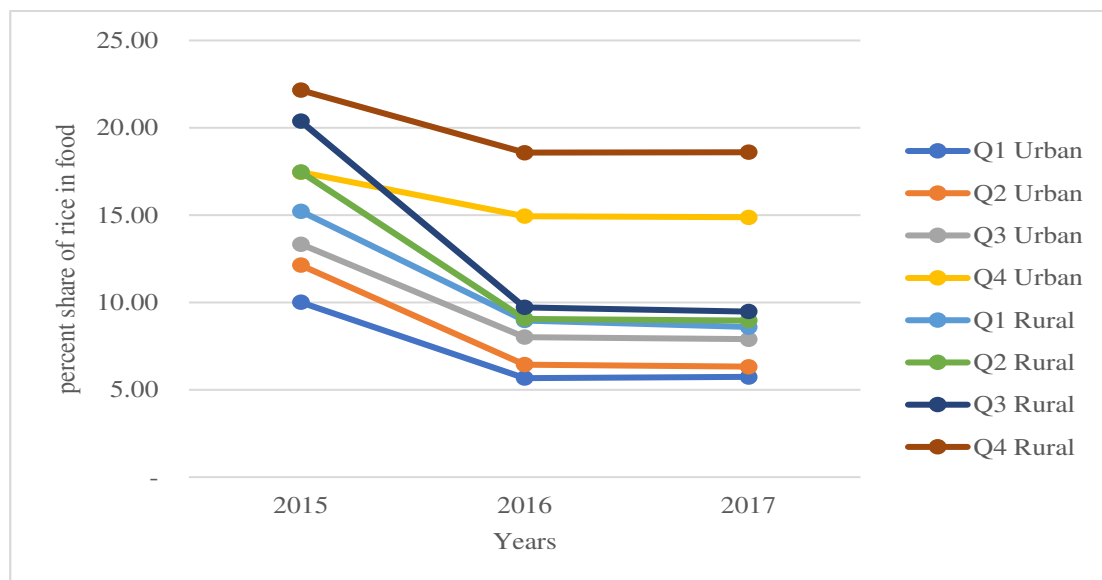
Figure 1. Share of rice in food household respondent (level of Expenditure)

Rural households consume more rice than urban households (**Figure 1**). Q4 households have a higher share of rice food expenditure in rural areas than in urban areas. The share of rice food expenditure in Q4 decreased both in urban and rural areas from 2015 – 2016 as well as the share of household expenditure in Q1, Q2, Q3, and Q4. The results of this study are following the results of the study (Purwaningsih et al., 2010, 2015). The decline in the share of rice food expenditure was in line with the decline in rice prices (**Figure 2**). The price of rice in urban areas is more expensive than the price of rice in rural areas. Although the share of rice expenditure is larger in urban areas, the caloric adequacy is greater in rural areas than in urban areas (**Figure 3**).

Income And Prices Food Elasticity Of Food Demand In Java 2015 – 2017

The results showed that all commodities have their own-price elasticity (own price elasticity) which is negative. This is following the theory of demand where the demand curve has a downward sloping. **Table 3** shows the results of the estimation of elasticity using the LA/AIDS model. Based on **Table 3**, it is found that the elasticity value of each commodity is less than -1, this means that the commodity is inelastic. The most inelastic commodity is commodity W2 (corn), where price changes do not have much impact on changes in demand. This is because the share of expenditure on these commodities is very small. If the price itself is inelastic, that means changes in commodity prices do not significantly affect changes in demand. The results of the analysis show that food commodities have their own-price elasticity values of less than 1 which means they are inelastic. If the own-price elasticity of the food commodity increases, households must increase their spending to consume the food. This is because households have a low response to price changes. The results of the study are following economic theory. Rice has its own elasticity value of -0.949 which means it is inelastic. This shows that the income of the population in Java is still low, and the main food commodity is still dominated by rice.
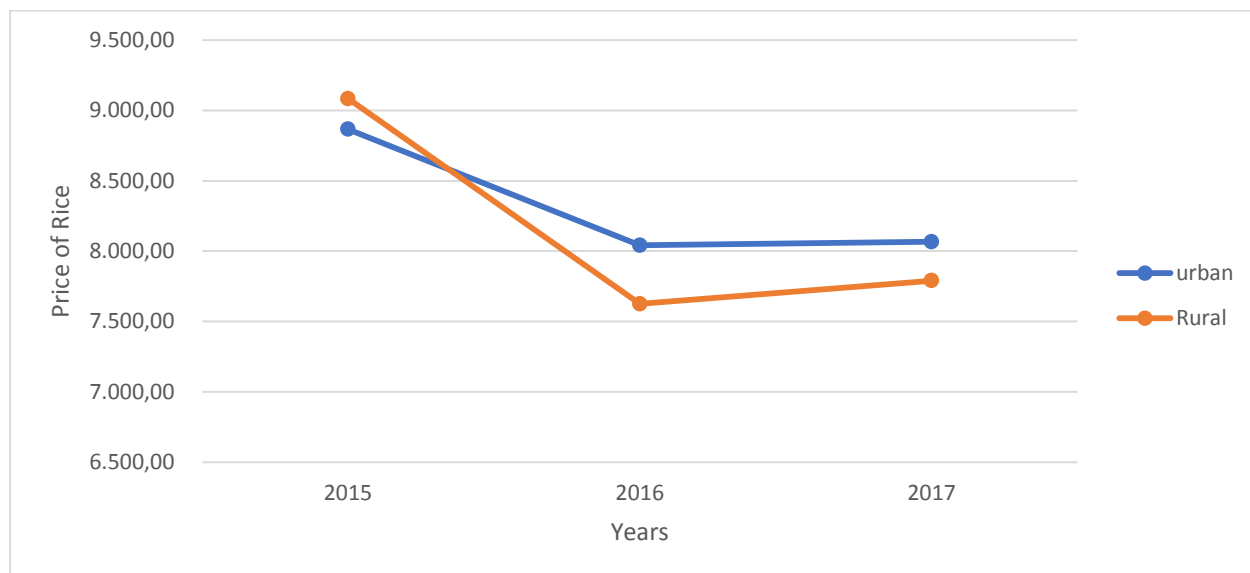

Figure 2. Price of Rice

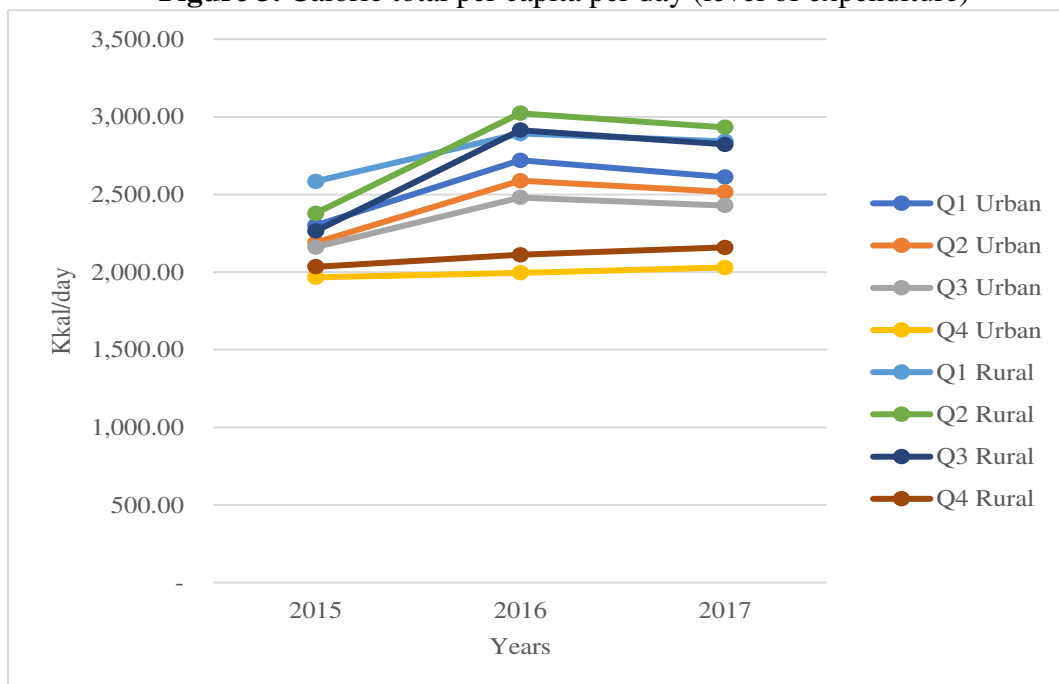**Figure 3.** Calorie total per capita per day (level of expenditure)

Table 3. Own-price elasticity and cross-price elasticity of household in Java 2015 – 2016

Food	Price											
	W 1	W 2	W 3	W 4	W 5	W 6	W 7	W 8	W 9	W 10	W 11	W 12
W1	**- 0.949**	- 0.303	- 0.072	- 0.105	- 0.117	- 0.005	- 0.008	- 0.049	- 0.030	- 0.013	- 0.040	- 0.032
W2	- 0.007	**- 0.230**	- 0.053	- 0.044	- 0.031	0.001	- 0.002	- 0.010	- 0.006	0.004	- 0.003	- 0.007
W3	- 0.003	- 0.065	**- 0.698**	- 0.025	- 0.009	- 0.001	- 0.001	- 0.002	0.000	- 0.001	- 0.001	- 0.003
W4	- 0.003	- 0.042	- 0.020	**- 0.572**	- 0.016	- 0.001	- 0.001	- 0.004	0.001	- 0.001	- 0.001	- 0.005
W5	- 0.007	- 0.064	- 0.016	- 0.036	**- 0.625**	- 0.002	- 0.002	- 0.006	0.001	- 0.003	- 0.003	- 0.009
W6	- 0.024	0.033	- 0.014	- 0.010	- 0.023	**- 0.870**	- 0.026	- 0.019	- 0.023	- 0.034	- 0.020	- 0.015
W7	- 0.017	- 0.026	- 0.013	- 0.014	- 0.011	- 0.017	**- 0.864**	- 0.008	- 0.013	- 0.020	- 0.002	- 0.010
W8	- 0.019	- 0.109	- 0.015	- 0.045	- 0.028	- 0.008	- 0.004	**- 0.821**	- 0.011	- 0.008	- 0.009	- 0.006
W9	- 0.013	- 0.057	0.005	0.010	0.010	- 0.009	- 0.007	- 0.010	**- 0.871**	0.005	- 0.002	- 0.018
W10	- 0.013	0.056	- 0.004	- 0.009	- 0.016	- 0.016	- 0.014	- 0.009	0.008	**- 0.871**	- 0.014	- 0.017
W11	- 0.025	- 0.042	- 0.012	- 0.014	- 0.016	- 0.012	0.001	- 0.013	- 0.003	- 0.018	**- 0.856**	- 0.021
W12	- 0.010	- 0.046	- 0.016	- 0.033	- 0.029	- 0.004	- 0.003	- 0.004	- 0.013	- 0.010	- 0.009	**- 0.820**

W1 : rice
W2 : corn dan product of corn
W3 : flour
W4 : cassava
W5 : sweet potato
W6 : fish

W7 : meat
W8 : eggs
W9 : vegetables
W10 : nuts and product of nuts
W11 : fruits
W12 : instant noodles

Table 4. Income Elasticity

Comodity	Income Elasticity
Rice	1.21
Corn dan product of corn	0.76
Flour	0.83
Cassava	0.76
Sweet potato	0.79
Fish	0.87
Meat	0.84
Eggs	0.89
Vegetables	0.91
Nuts and product of nuts	0.93
Fruits	0.91
Instan noodles	0.91

Cross elasticity has two signs, namely positive (substitute goods) and negative (complementary goods). The cross-price elasticity of rice commodities has a negative value against other food commodities. This means that other food commodities are complementary goods. Rice has a close complementary relationship with fish and corn commodities. The relationship between rice and corn, if there is an increase in the price of corn by 10 percent, it will reduce demand for rice by 3.03 percent, while other commodities are less than 2.00 percent.

Substituting commodities are corn with beans, wheat flour with fruit, sweet potato with fruit, corn with fish, fruit with meat, fruit with corn, fruit with cassava, fruit fruits with sweet potatoes, and fruits with nuts. The value of the elasticity of all substitute commodities is less than 0.03.

The results of the LA/AIDS model, while the demand for rice is responsive to changes in household expenditure. Other commodities are also responsive to changes in household spending. If there is an increase in income by 10 percent, the demand for rice commodities will increase by 12.1 percent. From the results of this study, it can be concluded that there needs to be a special policy related to commodity prices and income. The results of the analysis show that the elasticity of the own price of food is greater than the elasticity of expenditure, except for the commodity of rice. This shows that household food demand is more influenced by food prices than household income, unlike the commodity rice. The demand for rice commodities is more influenced by expenditure. This is thought to be caused by differences in the price of rice in each category of people's income. Where the results of the study indicate that if the groups based on per capita income groups become 4 household groups (Q1, Q2, Q3, and Q4), in terms of quantity the total consumption of Q4 and Q1 is different. The proportion of rice expenditure in the Q4 community is larger than in Q1. Likewise, the quantity of consumption in Q4 is greater than in Q1.

CONCLUSION AND RECOMMEN-DATION

Conclusion

The share of household food expenditure in urban and rural areas for income groups Q3 – Q4 is more than 50 percent and is still food insecure. The share of food expenditure is still dominated by grains. The self-price elasticity for all food commodities has a negative sign, which means that it is a Giffen good. Price elasticity itself is elastic, which means that changes in demand for food commodities are not responsive to changes in their own-prices (inelastic). The cross-price elasticity of each commodity with negative and positive values is inelastic. Demand for rice commodities is responsive to changes in expenditure. Household food demand is more influenced by food prices than household income for food commodities except for rice commodities. Rice has an elastic expenditure elasticity, meaning that food demand is very responsive to changes in household expenditure/income.

Recommendation

To achieve food security, govern-ment intervention is needed to maintain price stability and encouragement to

increase food diversification. Food diversification policy will be achieved if the government also pays attention to aspects of the local food processing industry and local food providers (farmers). This research is still incomplete because in this study the elasticity of each household is not differentiated based on regional differences and expenditure groups. The next hope for analyzing food demand is to classify households by region and income group.

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