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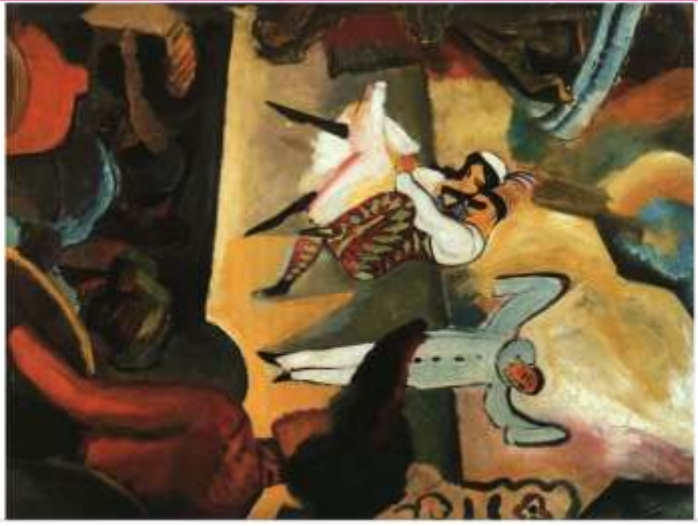

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Analysis of demand for food commodities and its impact on the poverty

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Abstract

This study is written to investigate the influence of price, income and demographic variables such as residential area and number of household members towards the demand for food commodities as sources of poverty in Aceh using the Almost Ideal Demand System (AIDS). The result of data analysis shows that prices and income have a significant effect on the demand for food commodities among poor families in Aceh. In conclusion, the socio-demographic characteristics showed that the demand for poor households in particular food commodities in an urban area is lower than in a rural area.

Keywords: Demand, food, commodities, elasticity, poverty.

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Análisis de la demanda de productos alimenticios y su impacto en la pobreza

Resumen

Este estudio está escrito para investigar la influencia de las variables de precios, ingresos y demográficas, como el área residencial y el número de miembros del hogar, en la demanda de productos alimenticios como fuentes de pobreza en Aceh utilizando el Sistema de Demanda Casi Ideal (SDCI). El resultado del análisis de los datos muestra que los precios y los ingresos tienen un efecto significativo en la demanda de productos alimenticios entre las familias pobres de Aceh. En conclusión, las características sociodemográficas mostraron que la demanda de hogares pobres en particular productos alimenticios en un área urbana es más baja que en un área rural.

Palabras clave: demanda, alimentos, commodities, elasticidad, pobreza.

1. INTRODUCTION

The poverty alleviation is still being heavy-duty and biggest challenges for many countries worldwide, including Indonesia. It is not only about reducing the number of poverty among society but it is expected to elevate the essential human rights in both physically and mentally. This matter has been becoming one of the Millennium Development Goals (MDGs) as a piece of guidance for the development of UN members. It aims to achieve the people's welfare

and community development in the year 2015. Among ASEAN countries which focus on MDGs objectives, Indonesia and Aceh have categorized not succeeded in achieving the MDGs target (7.55 percent) especially related to poverty. The level of poverty in Indonesia and Aceh were relatively high i.e. 11.22 and 17.08 until the end of 2015. However, Indonesia and Aceh have not achieved the MDGs target and now it is continued with the Sustainable Development Goals (SDGs) program (Sachs, 2012).

There various issues related to poverty in Aceh and it caused by several factors (Central Bureau of Statistics, April and July 2017). First, In March 2017, Aceh has experienced deflation as much as -0.15 percent. Second, the price has declined in some food commodities such as tuna and rice are -0.215 percent and -0.152 percent respectively, reducing the increase in the poverty line. In addition, the food commodities are the most influential factors on the poverty line in both urban and rural areas i.e. rice. It was contributed as much as 20.24 percent in urban and 26.05 percent in the rural area. The second largest contributor commodity to poverty line is filter-cigarettes contributed 13.19 percent in urban and 14.28 percent in rural. Other commodities that also contributed to the poverty issue in Aceh i.e. tuna fish as much as 5.09 percent in urban and 3.87 percent in rural areas. Lastly, in early 2017, there were obstacles to the distribution of prosperous rice or known as Raskin.

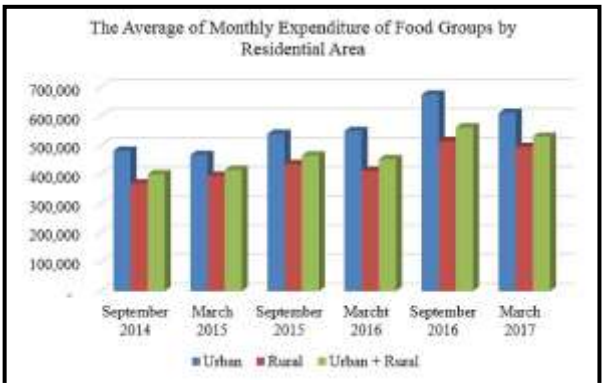

Figure 1: The Average of Monthly Expenditure of Food Groups by Residential Area (in IDR)
Source: Central Bureau of Statistics – BPS

In general, we found that the commodities that contributed to the poverty in Aceh namely food group are five commodities including rice, filter cigarettes, tuna fish, broiler eggs and cakes, with the highest percentage rural and urban areas is rice. The figure can be seen in Table 1 as below:

Table 1: The Largest Contributor to the Poverty in Aceh by Food Commodities

The type of commodity	Urban	the type of commodity	Rural
(1)	(2)	(3)	(4)
Food:	**72,08**	**Food:**	**77,81**
Rice	20,24	Rice	26,05

Filter cigarettes	13,19	Filter cigarettes	14,28
Tuna fish	5,09	Tuna fish	3,87
Broiler eggs	3,54	Broiler eggs	3,15
Cakes	2,88	Cakes	3,43

Source: BPS

Using several previous studies have been discussing the factors that contributed to poverty, we found that past studies frequently focused on food commodities demanded (Latincan et al., 2013; Suryanty & Reswita, 2016). A study by Latincan et al. (2013) concerned with food demand in Malaysia such as meat, fruit vegetables, sugar, and other beverages and foods. Latincan et al. (2013) studied about demand elasticity of rice in the Philippines based on the group of income households. Susanti (2014) highlighted on animal food groups such as fish, meat, poultry, eggs, and milk in West Java, Indonesia. In addition, Wahyuni et al. (2016) and Suryanty & Reswita (2016) also pay attention to having emphasized household demand behavior for three sources of animal protein including fish, beef, chicken meat, and broiler eggs.

However, there limited previous studies were focusing on the food and non-food commodities (Kahar, 2010). They studied more concerned on the consumption behavior of poor household toward food and non-food commodities, and socioeconomic and also demography characteristics as a piece of factors were contributed to poverty. In line

with the limited studies employed by earlier authors (Kahar, 2010; Mayasari et al., 2018; Deaton and Muelbauer, 1980).

2. LITERATURE REVIEW

Poverty is characterized by a low per capita income and a wideranging gap in the distribution of income among society (Todaro, 2000). The Central Bureau of Statistics defines poverty as an inability to meet the minimum standards of basic needs of food and non-food commodities. Further, Todaro and Smith (2006), stated that poverty basically can be categorized as two i.e. absolute poverty and relative poverty. In addition, they also define absolute poverty as the condition of a number of people who are unable to obtain sufficient resources to meet basic needs and they live below a certain level of real income known as the poverty line. The relative poverty is related to social inequality. With respect to the poverty issue, the minimum standard of poverty can be illustrated using a poverty line (Rahardja & Manurung, 2004; Gilarso 2003).

The demand theory is derived from consumer behavior. It aims to maximize the level of satisfaction of individual or utility maximizing depends on the budget constraint. The utility maximization can be explained by the demand curve. The curve describes the number of goods that consumers buy prices in a certain period. According to Pindyck & Rubinfeld (2009), the demand depends on prices, where

consumers are usually willing to buy more if prices go down. Further, they also added that the demand curve has downward sloping. It means that the increasing price causes the demand for goods are declined and motivate consumers to buy cheaper goods. In a neo-classical economic perspective, the demand curve can be derived from two different sides. the demand curve can be derived from maximizing satisfaction or a utility then the result is an ordinary demand curve or also called a Marshallian demand function (Mclaren et al., 2000; Irvine & Sims, 1998; Deaton and Muelbauer, 1980).

The previous discussion above only focused on food commodities, meanwhile the studies were employed by Kahar (2010), Suryanty & Reswita (2016), Yusdianto (2016), Mayasari, et al., (2018) and others. They give attention to food and non-food commodities, including the socioeconomic and demography factors. A study by Susanti (2014) concerned with animal food groups commodities such as fish, meat, poultry, eggs, and cow milk. She found that the consumption of an individual for animal foods is influenced by its own price, the other commodities price, and income, the number of household members, income class, residential area, and education level of the head of household. Fish and eggs are normal goods, meanwhile meat, poultry, and milk categorized as luxury goods (Wahyuni et al., 2016; Suryanty & Reswita, 2016).

Having the above discussion, we found some missing points and limited study that focuses on food commodity and its impact on poverty even more which concerns in Aceh, Indonesia. This study

would be improving the current previous studies were conducted on the issue of consumer behavior through demand and expenditure patterns. In contrast, this study applied the Almost Ideal Demand System for analyzing the impact of food commodities and sociodemographic characteristics of poverty in Aceh. Updated data (March 2017) are also being a piece of another main contribution from this study. It expects could be displaying the real phenomena among poor household and the most influential factors as the source of poverty in Aceh (Mayasari et al., 2018; Yusdianto, 2016).

3. MATERIALS AND METHODS

The design of this study is quantitative research using crosssectional data collected by the Central Bureau of Statistic in March 2017. The secondary data retrieved from the National Socio-Economic Survey (SUSENAS) that was published by BPS, 2017. This model used to estimate the demand for a commodity that is peroxided by the large proportion of household expenditure for various commodities. The AIDS model is derived from the Marshallian demand function which considers the individual expenditure proportions and has been applied in various studies are cross-sectional data. The general form of the AIDS model can be specified as in equation (1.1) below:

$$W_i = a_i + \sum_j \beta_{ij} \ln P_j + \gamma_i \ln\left(\frac{X}{P^*}\right) \qquad (1.1)$$

Where W_i is the proportion of expenditure for each commodity, i (budget share) to total expenditure, i is 1,2,3, .., n. α, β, and γ denoted as the estimation parameter, Pj is the aggregate price of commodity group to j, X is the total household expenditure, and P^* is the price index estimated by the Stone Index. Further, the equation (1.2) is used to calculate the value of group aggregate price.

$$P_j = \sum_{i=1}^{n} W_i P_i \qquad (1.2)$$

Where P_j is the aggregate price of a commodity group to j, W_i is the proportion of a commodity group, and P_i is a commodity price i and i = 1,2,..., n

In the present study, we use a transformation technique i.e. semilog form to create a specific econometric model of this study. Further, the equation (1.3) formulated by adding socio-demographic characteristics including residential areas of residence and the number of household members Susanti (2014), Mayasari et al. (2018) and others (Kahar, 2010). The two consumers can be described as two different indifference curves whereas the indifference curve will be in the most preferred commodity. However, when the preferences of a particular commodity are greater than the preference of sociodemographic characteristics, are more elastic on household

expenditure. Therefore, AIDS model would be estimated using OLS (ordinary least square). The equation of the AIDS model can be set up as seen as follows:

$$W_i = a_i + \sum_j \beta_{ij} \ln P_j + \gamma_i \ln\left(\frac{X}{P^*}\right) + \sigma_i HRA + \rho_i NHM + \varepsilon_i$$

Where:

W_i = Proportion of expenditure for commodity *i* to total expenditure of commodity j (budget share)

Pj = Commodity group prices to *j* ($j = 1, 2 \ldots n$)

X = Total household expenditure (as an income value approach)

P = Stone Index

HRA = Area of household residence (measured by dummy i.e.1 is urban and 0 is rural)

NHM = Number of household members ε_i

= Error term

Besides that, to examine the response of the change in the variable in demand for a commodity, due to price changes (own price elasticity and cross-price elasticity), income level changes (income elasticity) and socio-economic characteristics changes, such as changes in the number of household members. We use the equation (1.4, 1.5, 1.6, and 1.7) as below:

Own Price Elasticity:

$$e_{ii} = \frac{\gamma_{ii} - \beta_i W_i}{W_i} - 1$$

Cross Price Elasticity: $$e_{ij} = \frac{\left(\gamma_{ii} - \beta_i W_i\right)}{W_i}, i \neq j \quad (1.5)$$

Income Elasticity: $$e_{iy} = \frac{\beta_i}{W_i} + 1$$

Socio-demographic Elasticity: $$e_{ik} = \frac{\partial_i}{W_i}$$

4. RESULTS AND DISCUSSIONS

4.1. The Results of the AIDS Model Estimations

As aforementioned in the previous part, we use the AIDS model to estimate the value of demand for food commodities as sources of poverty in Aceh, Indonesia. The independent variable used in this study is the household expenditure that proxied by income, prices of selected food commodities such as rice, tuna, broiler eggs, cakes, filter cigarettes. For socio demography characteristics, this study uses the residential area and number of household members as a proxied. Using equation (1.3), the results of the AIDS model analysis can be presented as follows:

Table 2: The Result of the Almost Ideal Demand System (AIDS) Estimations

Food Commodity	Constant	Price					X	HRA	NHM
		Rice	Tuna fish	Broiler eggs	Cakes	Filter Cigarettes			
W_Rice	-0.2685	0.3927***	-0.0288***	-0.0248***	-0.0334***	-0.1727***	-0.0246	-0.0030	-0.0004
W_Tuna fish	0.1407	-0.0493***	0.1444***	-0.0190***	-0.0034	-0.0715***	-0.0244**	-0.0023	0.0004
W_Broiler Eggs	0.0151	-0.0155***	-0.0013	0.0988***	-0.0014	-0.0150***	-0.0007	0.0018	-0.0003
W_Cakes	.0858	-0.0232***	-0.0009	0.0017	0.0927***	-0.0184***	-0.0085	-0.0002*	0.0058***
W_Filter Cigarettes	.0570	-0.3047***	-0.1134***	-0.0568***	-0.0545***	0.2775***	0.0582*	-0.0023	0.0005
R-square		0.8730	0.6968	0.7581	0.7102	0.9032			
DW statistic		1.8459	1.5559	1.9061	1.7532	1.7284			
F statistic		547.287	182.968	249.530	195.163	742.787			
Prob F statistic		0.0000	0.0000	0.0000	0.0000	0.0000			

Note: ***, **, * significant at 1%, 5%, and 10%.

Table 2 above shows the result of the Almost Ideal Demand System (AIDS) Estimations. From the Table, we found that the value of R square is categorized as relatively high. In other words, this result indicates that the model performs very well. The R-square value of the five AIDS model equations is relatively high. The lowest value of R Square is 69.68 percent for tuna fish, 71.02 percent for cakes, 75.81 percent for broiler eggs, and 87.30 percent of rice until the highest 90.32 percent of filter cigarettes. R-square value can be interpreted to be around 0.6968 to 0.9032 percent. It means that independent variables could be explaining their effect on expenditure for food commodity group as much as 69.68 to 90.32 percent.

Further, the result of this study found that food commodity prices generally in Aceh shows highly significant in both (own and cross-commodity prices). In addition, this study found that price of food groups including rice, tuna, broiler eggs, wet cakes, and filter cigarettes have a positive and significant effect on the proportion of expenditure for those commodities at one percent significance level. It means by assuming increase one percent in the price of the commodities, it will be increasing the proportion of expenditure for each commodity as much as 0.39 percent for rice, 0.14 percent for tuna, 0.09 percent for broiler eggs and wet cakes and 0.27 for filter cigarettes, respectively.

Likewise, most of the estimated parameters for other food commodities price (cross prices) are significant at one percent significance level on the proportion of food commodities expenditure, except at the cross price between cakes and eggs. It indicates that increasing prices for other food commodities will be followed by a decrease in the proportion of expenditure for each commodity. Meanwhile, the positive sign of egg prices to the proportion of cake expenditure can be explained that eggs are input used in baking so that the increase in egg prices stimulate the cakes price, in turn, causes the proportion of expenditure on cakes to increase.

The variable of poor household's expenditure in Aceh has a significant effect on the proportion of each commodity expenditure, especially tuna and filter cigarettes at 5-10 percent significance level. Expenditure has a negative effect on the proportion of expenditure for

rice, tuna, broiler eggs and cakes about -0.007 to -0.0246. The negative sign of coefficient means that by assuming the increase one percent in the proportion of expenditure (or also called income) of poor households will be reducing the demand for these food commodities by 0.7 percent to 2.46 percent. In contrast, the filter cigarettes expenditure shows a positive effect on the proportion of household expenditure. It is meaning that when one percent the income of poor households increase, then they would allocate their expenditure for other types of food commodities such as filter cigarettes by 0.0582 percent. This is what triggers smoking to be the main cause of poverty.

4.2 The Result of Elasticity Testing

To find out the response of the proportion of food commodities expenditure as sources of poverty due to changes in prices and income in poor households in Aceh Province, we calculate the elasticity value using equation (1.4, 1.5, and 1.6). The result of elasticity testing which involving the own price, cross price, income and socio-demographic characteristics on poverty are as presented in Table 3 below:

Table 3: The Result of Elasticity of Demand for Food Commodities

Food commodity	Price (E_{ii} & E_{ij})					Income (E_{iy})	Socio-Demographic (E_{ik})
	Rice	Tuna fish	Broiler eggs	Cakes	Filter Cigarettes		
Rice	**-0.18578**	-0.05016	-0.04567	-0.06286	-0.32509	0.95052	-0.00077
T	-	-	-	-	-	0	0.0

una fish	0.23542	**0.06217**	0.10719	0.00825	0.38301	.84596	0259
B	-	-	**(**	-	-	0	-
roiler Eggs	0.18162	0.01377	**.19081**	0.01613	0.17639	.99104	0.00341
C	-	0	(	**0**	-	0	0.0
akes	0.21620	.00489	.02765	**.06545**	0.16630	.90310	6573
Fi	-	-	-	-	-	1	0.0
lter Cigarettes	0.74565	0.27399	0.13777	0.13310	**0.43805**	.13007	0109

Using Table 3 above, we would be reported the results of the analysis into four including the elasticity of price (own price and cross price), income elasticity and socio-demographic characteristic elasticity. The own price elasticity indicates the level of sensitivity of a commodity to changes in the commodity price. The result in Table 3 shows the price elasticity of food commodities in poor households in Aceh Province has a negative value ranging from -0.062 to -0.438, especially in rice, tuna, and filter cigarettes. It indicates that a one percent increase in commodities price cause a decrease in the demand of that commodities by 0.062 percent to 0.438 percent. Therefore, confirms these commodities are basic needs, which means that if the price changes, it does not decrease more on the goods consumed or in other words the proportion of food commodity expenditure is less responsive to price changes.

The result of the analysis also found that the value of cross-price elasticity between one food commodity and another food commodity has a negative sign; this reflects the existence of complementary relationships. For example, tuna, broiler eggs, cakes, and filter cigarettes are complementary commodities in rice consumption. Similar results with the elasticity of other food commodities have a

complementary relationship with each other with a negative sign. However, the elasticity of the cross price of the tuna and broiler eggs to cakes is substituted with a positive elasticity value. The most responsive of commodities due to changes in cross prices occur in the complementary relationship of rice to filter cigarettes with an elasticity value by -0.745. This means that a one percent increase in rice prices will decrease the demand for filter cigarettes by 0.745 percent. Conversely, the lowest response in cross-price elasticity is tuna fish to the cake by 0.004 so the relationship is not strong.

For income elasticity, this study found that income elasticity as a proxy of household expenditure is a positive by approximately 0.846 to 1.130, meaning that those commodities are normal goods, so that if an increase of one percent in the income of poor households will increase the consumption of food commodities by 0.846 percent to 1.130 percent. It can be seen from the elasticity of filter cigarettes is more than one (elastic), while for rice, tuna, eggs, and cakes have value is less than one (inelastic). In addition, the result of this study shows that each commodity has an elasticity value in the number of household members that vary. The elasticity of the number of household members with a positive value is found in tuna (0.00259), cakes (0.06573) and filter cigarettes (0.00109) while the elasticity of
the number of household members with negative values is found in rice (-0,00077) and broiler eggs (-0.00341) (Indriastuti, 2019).

4.3 Research Discussions

The issue of poverty among society has been taking more attention of academician and government. The poverty can be determined by a low per capita income and a wide-ranging gap in the income distribution among society and also an inability to meet the minimum standards of basic needs through food and non-food commodities. Using the results, this study indicated that food commodity prices generally in Aceh shows highly significant in both. The price of food groups including rice, tuna, broiler eggs, wet cakes, and filter cigarettes have a positive and significant effect on the proportion of expenditure for those commodities. Besides that, most of the estimated parameters for other food commodities price has a significant effect on the proportion of food commodities expenditure, except cakes and eggs (Susanti; 2014;Yang et al., 2019).

Having that, using the results of elasticity testing, we found that price elasticity for food commodities has a significant negative relationship among poor household especially, rice, tuna, and filter cigarettes. Both relationships in line with a priori theoretical sign between the price and quantity of demand (Nicholson, 2002; Latincan et al., 2013). This finding consistent with the study by Mayasari et al. (2018) found that all food commodities of poor households are normal goods and some are included in the category of luxury goods. Furthermore, the elasticity of filter cigarettes is elastic, while for rice, tuna, eggs, and cakes are inelastic. Yusdianto (2016) stated that

elasticity of the number of household members has positive or negative for the proportion of food expenditure (Soo et al., 2019).

5. CONCLUSION AND RECOMMENDATIONS

Based on the results of the analysis, we conclude that the price and income have a significant effect on the demand for food commodities in Aceh, Indonesia. Further, we found that the effect of price on itself is positive, and cross prices and income are negative. The socio-demographic characteristics showed that the demand for poor households in particular food commodities in an urban area is lower than in a rural area. Meanwhile, the number of household members has a significant positive effect on the demand in poor households, especially on cakes.

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