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Household Demand for Food Prepared at Home and Food Away from Home in Indonesia

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Abstract

This study aims to analyze the demand for food among Indonesian households, consisting of foods prepared at home (FPAH) and food away from home (FAFH). Utilizing longitudinal data from the National Socioeconomic Survey 2011-2013, combined with the Village Potential Statistics, the study estimates the demand with the Linear Approximated Almost Ideal Demand System (LA/AIDS). The results show that both FPAH and FAFH are normal goods but FAFH is more elastic than FPAH. Additionally, in terms of income elasticity, we found that households show stronger responses in consumption on FAFH, compared to FPAH. We also present heterogeneity analysis on different types of household characteristics.

Keywords: household demand, food prepared at home, food away from home

JEL classifications: D10; D12; I12

1. Introduction

Food consumption patterns in developing countries have undergone notable changes along with the changes in various socioeconomic factors. Several studies have documented the evidence of Engel's law, which shows that as income increases, the proportion spent on food decreases (Guo et al. 2000; Anker 2011; Pope 2012). Likewise, other research confirms Bennet's law, indicating that with rising income, households shift their consumption from starchy staple foods to more nutrient-dense options (Grigg 1996; Delgado 2003; Reardon, Henson & Gulati 2010; Gouel & Guimbard 2019). Another crucial aspect explored in the recent economic literature is the shift in consumption from food prepared at home (FPAH) to food away from home (FAFH), which includes purchases from restaurants, fast food outlets, and other sources outside the home.

The growing trend of FPAH consumption has been observed in both developed (Kant, Graubard & Kumanyika 2007; Drewnowski & Rehm 2013) and developing countries (Zheng & Henneberry 2010). Although eating out offers convenience, it is frequently associated with lower nutritional quality compared to eating at home (Poti et al. 2015) and linked to an increased risk of certain health conditions (Popkin, Adair & Ng 2012; Zong et al. 2016). Understanding the dynamics of household food consumption between FPAH and FAFH holds immense importance in shaping the dietary habits of the households.

Indonesia, with its prominent development progress and diverse cultural background, offers a unique context for studying the food consumption preferences of its households. The nation has been experiencing rapid urbanization, rising incomes, and evolving lifestyles, which have led to a notable shift in how people approach their meals (Reardon, Henson & Gulati 2010). Traditional home-cooked meals, deeply rooted in the cuisine and the culture

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of the country, are increasingly challenged by the convenience and allure of dining out or purchasing ready-to-eat meals. However, despite the significant importance, there is a lack of economic studies covering the demand estimation of FPAH and FAFH in Indonesia, which thus motivates this study.

The primary objective of this paper is to investigate the household food consumption in Indonesia, taking into account socioeconomic factors that influence the choices. Specifically, we aim to estimate the household demand for FPAH and FAFH and calculate their elasticity with respect to price and income. To achieve this, we employed the Linear Approximate Almost Ideal Demand System (LA/AIDS), allowing us to address multiplicity problems between price, income, other consumption, and other exogenous factors. We utilized household longitudinal data from the 2011–2013 National Socio-Economic Survey (Susenas) and Village Potential Statistics (Podes).

The results of our price elasticity estimation suggest that FPAH and FAFH are normal goods, yet the latter is more elastic. The cross-price elasticity estimation shows that FPAH is a substitution for FAFH but not the other way around. We also find that households show bigger responses in consumption of FAFH when their own price or income changes. A heterogeneity analysis based on poverty status as well as a cross-price elasticity analysis will be presented.

This study contributes to the growing literature on food consumption patterns in developing countries, particularly concerning FAFH and FPAH. For example, Nayga Jr & Capps Jr (1992) discover that the demand for FPAH is more price-sensitive than the demand for FPAH, yet this finding is inconclusive as other studies present different results. Ma et al. (2006) argue that the responsiveness of FAFH demand to increases in income rises for those who are wealthier while Angulo, Gil & Mur (2007) reason that the response varies depending on the age of the heads of the households, their employment status, and the size of the town of the residents. In addition, this study complements previous research in Indonesia that focuses only on estimating aggregated food demand (Pangaribowo 2010; Widarjono & Rucbha 2016) and identifying its determinants (Pahlevi et al. 2018).

The rest of this paper is structured as follows: Section 2 provides a comprehensive review of the relevant literature on household food demand, focusing on the factors influencing food choices at home and away from home. Section 3 outlines the data sources and methodology employed in this study. Section 4 presents the results and discussions, highlighting the key determinants of household food consumption patterns in Indonesia. Finally, Section 5 concludes the paper, summarizes the main findings, presents several limitations, and emphasizes the policy implications of this research.

2. Literature Review

Becker (1965) introduces the concept of household production theory, which expands on the traditional demand theory to examine how various factors, such as prices, income, demographics, and time constraints influence household purchasing decisions regarding items such as food. According to this economic framework, the costs associated with consumption encompass not only prices but also the time spent on activities such as eating, food preparation, and post-meal cleanup. Consequently, households need to make choices regarding the allocation of time and effort for different aspects of meal consumption, such as whether to prepare food at home or outsource certain tasks like cooking and cleaning by purchasing food from outside. The optimal decision hinges on several considerations, including the financial condition of the household, the opportunity cost of the time of household members, and the cooking skills of household members.

Several studies on food demand build their work on the household production theory, including Kinsey (1983), Park & Capps Jr (1997), and Keng & Lin (2005). However, while Kinsey (1983) presents the Beckerian model of household production in her

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examination of the demand for FAFH purchases by households, her empirical model does not align with the theory of Becker. For instance, she argues that the wages of employed women do not vary significantly and consequently omit the consideration of the opportunity cost of women in terms of time when analyzing the household demand for FAFH.

Empirical analyses have further shown how specific economic and demographic characteristics of a household influence the demand for FPAH and FAFH. Lee & Brown (1985) find that households with high incomes and those living in urban areas consume more FAFH. Steyn, Labadarios & Nel (2011) document that the male population consumes more FAFH than the female counterpart. Moreover, the proportion of expenditure on FAFH increases with the rise in the work participation of women (Nayga Jr & Capps Jr 1992). The higher the income of women and the higher the opportunity cost of their time, the less time they have to prepare food at home (Tashiro & Lo 2012). Other studies have investigated personal factors that promote FAFH consumption, including lack of skills in preparing food at home (Lam & Adams 2017), living outside the hometown, traveling long distances, and the accessibility of raw ingredients for preparing food (Steyn, Labadarios & Nel 2011).

The dynamics of household food consumption, particularly the choice between FPAH and FAFH, demand the attention of researchers and policymakers due to their implications for public health, nutrition, and sustainable food systems. Several studies suggest that eating FPAH is associated with a higher intake of vegetables and fruits and a further reduction in carbonated drinks. Consuming more FPAH can prevent chronic diseases such as heart disease, gastrointestinal cancer, stroke, obesity, and diabetes (Soliah, Walter & Jones 2012). Furthermore, consuming FPAH using basic food ingredients such as whole grains, vegetables, and fruits can reduce body mass index and improve general health (Laska et al. 2012).

Meanwhile, processed foods produced in the industrial process tend to contain higher saturated fat, preservatives, and sugar than FPAH (Lam & Adams 2017; Steyn, Labadarios & Nel 2011). Consuming such foods has an impact on obesity and excess body weight, which increases the risk of various diseases such as hypertension, diabetes, coronary heart disease, and stroke (Cai et al. 2008). Furthermore, FAFH tends to have a lower nutritional quality than FPAH (Binkley 2006; Lam & Adams 2017).

In the case of Indonesia, most studies focus on identifying the factors affecting household food expenditure while neglecting the differences between FPAH and FAFH. Using Susenas data, Reardon, Henson & Gulati (2010) suggests that spending on staple foods decreases as income increases. However, varied consumption of food (and beverages) other than staple foods may not always promote good nutrition; particularly in the case of processed foods or any FAFH.

Our study contributes to the economic literature by investigating the household demand for FPAH and FAFH, providing insight into how households respond to changes in food prices and income. Such a study can guide further development of food diversification, which suits the interest of government agencies responsible for food security (Saliem 2002). Additionally, this study follows up on the concern conveyed by Roemling & Qaim (2012) about how processed foods and FAFH are associated with the obesity trend in Indonesia. They emphasize the need for targeted interventions to promote healthier food choices in the face of changing consumption patterns, including the role of FPAH and FAFH.

3. Method

3.1. Data Sources

This study utilized panel data from Susenas, a survey conducted by Statistics Indonesia (BPS) that covers a nationally represented sample. Specifically, we constructed our dataset from the consumption module and the core module. The former collected household consumption data, including various foods and beverages. The latter collected

socioeconomic information such as household size, expenditure, employment status, and education.

We used three-year panel data from Susenas, covering the period from 2011 to 2013. Although this period may seem outdated, it is the most recent longitudinal dataset in which Susenas used the same sample of households across years. After 2013, BPS collected different samples in each survey. The longitudinal character of the dataset is essential for our demand estimation method, which will be discussed in the next subsection.

The initial sample size in 2011 is 9,690 households. Due to attrition, the sample decreases to 7,982 in 2012 and then to 6,704 in 2013, resulting in a total of 24,376 observations being collected and analyzed. The attrition may lead to selection bias in analyzing households over the life of the panel. That is, the households that drop out may be systematically different from those that remain. Table 1 shows the average monthly per capita expenditure of different types of households: those who remain in the panel for all three years, those who drop out, and those who replace them (only in 2013). On average, the households in all three years are slightly poorer than the households who drop out of the panel. The households who drop out are more likely to be replaced with an even wealthier household. The net effect of attrition and replacement is unclear, in this regard, but an analysis of households who remain in the panel will capture the conditions and behavior of the poorer set of households than is nationally representative.

In addition to Susenas, we employed Village Potential Statistics (Podes) which are also collected by BPS. The survey provides residential characteristics such as the number of markets, shops, and restaurants in all villages in Indonesia. We merged Podes and Susenas using village-level identification.

Regarding poverty-related analysis, we combined Susenas with the poverty line set by the government in the respective period. We used poverty line data at the provincial level for 2011 to 2013, separated for urban and rural areas. Households are assigned into the poor group supposing their expenditure falls below the poverty line in their respective area. Note that the poverty line varies across provinces and years; several households may have different poverty statuses in different periods.

3.2. Estimation Method

We analyzed the demand for food by employing AIDS. According to Deaton & Muellbauer (1980), AIDS offers several advantages as it (1) provides a first-order approximation to any function of demand system, (2) meets the axiom of commodity selection appropriately, (3) perfectly aggregates consumer behavior without applying a linear Engel curve, (4) has a form of function that is consistent with household budget data, (5) has parameters that are easy to estimate without having to use non-linear methods, and (6) can be used to test homogeneity and symmetric restrictions. The AIDS demand function in the form of expenditure proportion has the following general form:

$$\mathrm{w_i} = \alpha_\mathrm{i} + \sum_\mathrm{j} \gamma_\mathrm{ij} \mathrm{logp_j} + \beta_\mathrm{i} \mathrm{log}\left\{\frac{\mathrm{y}}{\mathrm{P}}\right\} \qquad (1)$$

Where $\mathrm{w_i}$ is the proportion of expenditure for commodity i, p is the price, y is the total expenditure, and P is the price index defined as:

$$\mathrm{log(P)} = \alpha_0 + \sum_\mathrm{k} \alpha_\mathrm{k} \mathrm{logp_k} + \left(\frac{1}{2}\right) \sum_\mathrm{j} \sum_\mathrm{k} \gamma_\mathrm{kj} \mathrm{logp_k logp_j} \qquad (2)$$

Since the parameters in the price index equation are non-linear, we employed the Stone price index, defined as follows:

$$\mathrm{log(P^*)} = \sum_\mathrm{i} \mathrm{w_i logp_i} \qquad (3)$$

Using the Stone price index, the equation (2) becomes linear in price and expenditure. Thus, the demand function becomes a linear approximation

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Table 1. Sample Decomposition, Susenas 2011–2013

Household enumerated in year	Observation	Average monthly per capita expenditure (in Rupiah)		
		2011	2012	2013
2011, 2012, 2013	19,431	317,893	347,800	372,759
2011, 2012	3,010	340,861	371,767	
2011	1,621	379,165		
2011, 2013	174	262,341		319,170
2013	140			406,422

Source: Susenas, 2011–2013

of AIDS or so-called LA/AIDS:

$$\mathrm{w_i} = \alpha_0^* + \sum_{\mathrm{j}} \gamma_{\mathrm{ij}} \mathrm{log p_j} + \beta_{\mathrm{i}} \mathrm{log} \left\{ \frac{\mathrm{y}}{\mathrm{P^*}} \right\} \qquad (4)$$

Equation (4) is consistent supposing it meets the following restrictions:

- Adding Up:

$$\sum_{\mathrm{i=1}}^{\mathrm{n}} \alpha_1 = 1, \sum_{\mathrm{i=1}}^{\mathrm{n}} \gamma_{\mathrm{ij}} = 0, \sum_{\mathrm{i=1}}^{\mathrm{n}} \beta_{\mathrm{i}} = 0 \qquad (5)$$

- Homogeneous:

$$\sum_{\mathrm{j}} \gamma_{\mathrm{ij}} = 0 \qquad (6)$$

- Symmetric:

$$\gamma_{\mathrm{ij}} = \gamma_{\mathrm{ji}} \qquad (7)$$

Changes in prices and income will cause changes in the number of commodity goods consumed. This paper considers three types of elasticity: own-price elasticity, cross-price elasticity, and income elasticity. Own-price elasticity measures changes in the number of goods demanded against changes in their price. In contrast, cross-price elasticity measures changes in the number of goods demanded against other commodity prices. Lastly, income elasticity measures changes in the number of goods demanded against changes in income.

To estimate the demand for FAFH and FPAH, we employed LA/AIDS with the following specification:

$$\begin{aligned} \mathrm{w_{it}} \quad = \quad & \alpha_{\mathrm{it}} + \sum_{\mathrm{j}} \gamma_{\mathrm{it}} \mathrm{log p_{it}} + \beta_{\mathrm{it}} \mathrm{log} \left\{ \gamma \mathrm{y P^*} \right\}_{\mathrm{it}} \\ & + \sum_{\mathrm{j}} \mathrm{W_{it}} + \delta_{\mathrm{t}} + \mathrm{u_i} + \mathrm{e_{it}} \end{aligned} \qquad (8)$$

Where $\mathrm{w_{it}}$ is the proportion of household expenditure for a food group used as a proxy for household demand for food, y refers to total household income. $\mathrm{p_{it}}$ is the food price, and $\mathrm{P^*}$ is the Stone price index. Other explanatory variables are represented by $\mathrm{W_{it}}$, which are household and residential characteristics. The household characteristics include the years of schooling, age, employment, household size, the presence of children, the presence of elderly, and the presence of housemaid. The residential characteristics include urban dummy, the availability of markets, the number of stores, and the number of restaurants in the districts. The selection of explanatory variables is based on the previous studies discussed in the literature review section with respect to data availability. δ_{t} is time regressors; 2011 is used as the base year. Finally, $\mathrm{u_i}$ and $\mathrm{e_{it}}$ are within-entity error term and overall error term, respectively. The subscript i refers to households, and t refers to the period.

We performed entity and time fixed effect panel regressions. The parameters of the specification represent a common effect across entities controlling for individual and time heterogeneity. Given that no exogenous variation is present, we emphasized the significance of employing panel methods, particularly fixed effect, to address the influence of unobservable factors at the household level, such as individual preferences and tastes. These factors have

the potential to introduce bias in cross-sectional approaches. We provided different estimations for FPAH and FAFH separately.

In the Susenas data, price data are unavailable, and we could not run the regression immediately. As a substitution, we first estimated the unit value obtained through the distribution of expenditure for commodity j with the number of commodity j consumed by households. However, we must address the issues of quantity premium and the quality effect[1]. The difference in commodity purchase prices between households due to the quantity premium and quality effect and the simultaneous relationship between the proportion of expenditure and the unit value in the demand function model requires an instrument variable. Following Moeis (2003), we applied the following strategies: (1) Calculating the log unit value of each commodity group j ($\ln\_\mathrm{pj}$); (2) Calculating the average log unit value of each commodity group j ($\mathrm{lnpj\_ave}$); (3) Calculating the deviation between the log unit value of the commodity group consumed by households and the log unit value of the average commodity group. It can be written as follows ($\ln\_\mathrm{Dj} = \ln\_\mathrm{pj} - \mathrm{lnpi\_ave}$). (4) Performing a regression between ln variables as the independent variables with other independent variables as specified in equation (8). The estimated price for each commodity group j ($\ln\_\mathrm{epj}$) is calculated regardless of whether the household consumes the commodity group. Regarding households that consume commodity group j, the log form of the estimated commodity price j results from reducing the log unit value of commodity group j with the log deviation of the unit value of commodity group j ($\ln\_\mathrm{epj} = \ln\_\mathrm{pj} - \ln\_\mathrm{Dj}$). Supposing the household does not consume commodity group j, the log form of the estimated commodity price j results from reducing the log unit value of the average commodity group j with the log deviation of the unit value of commodity group j ($\ln\_\mathrm{epi} = \ln\_\mathrm{pj\_ave} - \ln\_\mathrm{Dj}$).

[1]Quantity premium is a condition with a difference in the number of goods purchased. Quality effect is a condition where there is a difference in the quality of the goods purchased.

Selectivity bias may exist when the observation includes households that do not consume one of the particular commodities for several reasons, such as lack of access to obtain the food, timing mismatch during the survey, and personal preferences in avoiding certain food commodities (Moeis 2003). Supposing this type of households is not included in the estimation, the estimated parameters will be biased. One way to address such an issue is to group food commodities into a same larger basket. However, this does not eliminate the possibility that several households still have zero consumption for certain grouped commodities. To address this, we performed a two-step estimation of Heckman using the Inverse Mills Ratio (IMR) as an independent variable in the primary model.

Subsequent to running the estimation, we calculated elasticity values using the following formula:

Price Elasticity

$$\varepsilon_{\mathrm{ii}} = -(\beta_{\mathrm{i}} + 1) + \frac{\gamma_{\mathrm{ii}}}{\mathrm{w_i}} \tag{9}$$

Cross-price elasticity

$$\varepsilon_{\mathrm{ij}} = -\beta_{\mathrm{i}} \left(\frac{\mathrm{w_j}}{\mathrm{w_i}} \right) + \frac{\gamma_{\mathrm{ii}}}{\mathrm{w_i}} \tag{10}$$

Income elasticity

$$\varepsilon_{\mathrm{i}} = 1 + \frac{\beta_{\mathrm{i}}}{\mathrm{w_i}} \tag{11}$$

Where the parameter definition follows equation (8).

4. Results and Analysis

Table 1 presents the descriptive statistics of the variables used in this study, grouped by year. In all observed years, households spend more on FPAH, ranging from 67% to 69%, compared to FAFH ranging from 20% to 23%. The proportions remained relatively stable across periods. As a comparison, the proportion of FAFH consumption is lower than the USA (47%), South Korea (47%), and Taiwan

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(26%) in 2000 (Keng & Lin 2005). Unfortunately, we do not have market price data for FPAH and FAFH in comparable units. We also do not present the estimated price value of FPAH and FAFH as they are in log terms, constructed based on the expenditure on commodity group, which thus have no direct meaning.

Other variables do not change sizably in aggregate across the periods. It is important to note that in more than half of the households, mothers participate in employment. The majority of households have children under 12 years old, amounting to approximately 60%. Around 16–17% of the sample have elderly people that they need to take care of. These characteristics may or may not affect their approach to preparing and eating food in the household.

Table 2 presents the results of regression from the model expressed in Eq. 8. We provided results for two dependent variables representing the demand for FPAH and FAFH. Column 1 is the standard specification of the entity fixed effect using only the main regressors, which are the estimated price for FPAH, FAFH, and tobacco, the log of real expenditure, and IMR. We add control variables in the second specification, presented in column 2. The coefficient of the main regressors changes dramatically from column 1 to column 2 in terms of sign reversal for FPAH and statistical significance for FAFH. We believe that the standard specification with no control suffers from an omitted variable bias, arguably coming from several variables such as the log of total consumption and the number of household members. Furthermore, we add the time fixed effect on the third specification. The coefficient of the main regressors slightly changes but remains statistically significant, indicating that the estimation is relatively stable after controlling for time heterogeneity.

Observing column 3 for FPAH, both its own price and the price of FAFH exhibit a significant negative correlation, implying that the consumption expenditure on FPAH decreases along with the increase in the price of FPAH and FAFH. In contrast, the expenditure on FAFH is positively associated with the price of both FPAH and FAFH. The log of real expenditure has a negative sign against the proportion of expenditure on FPAH and a positive sign for the proportion of expenditure on FAFH. As the expenditure represents income, a negative sign indicates that FPAH is a necessity item, while a positive sign indicates that FAFH is a luxury item. Nevertheless, to understand household demand behavior toward price change and income change, especially focusing on its magnitude, analyzing regression result is not sufficient. It requires calculating demand elasticity, which will be presented after discussing several other variables in the regression.

The result shows that both years of education of the father and the mother are not associated with the demand for FPAH. However, the educational attainment of women is positively correlated with the demand for FAFH, consistent with the results found by Keng & Lin (2005) and Nayga (1996). Following their interpretation, we argue that higher-educated women possess higher opportunity cost in preparing food for their family and thus tend to consume more FAFH. Furthermore, it may reflect that more educated mothers tend to be exposed to higher quality and more expensive food. The correlation of age and demand for FPAH and FAFH is mixed. The age of the mother is negatively correlated with FPAH consumption yet when the time fixed effect is relaxed, we discover a sign reversal. The reversal also happens in the FAFH estimation.

The participation of the mother in employment has no significant association with the demand for FPAH, which is in line with Smith, Ng & Popkin (2013). Nevertheless, for the demand for FAFH, the coefficient is negative and statistically significant at the 10% level, and this contradicts Nayga Jr & Capps Jr (1992). The presence of children in the household positively correlates with higher consumption of FAFH. Household managers may need more time to take care of children hence less time for preparing food, leading to more consumption of FAFH. In addition, younger generations prefer FAFH (Keng & Lin 2005). Nevertheless, such a pattern is not found in the case of the presence of

Table 2. Descriptive Statistics

	2011		2012		2013	
	mean	s.d	mean	s.d	mean	s.d
The proportion of household expenditure on FPAH	0.67	0.20	0.69	0.19	0.68	0.18
The proportion of household expenditure on FAFH	0.23	0.20	0.20	0.18	0.20	0.17
The proportion of household expenditure on tobacco	0.10	0.10	0.11	0.10	0.12	0.11
The years of schooling of the mother	6.92	4.56	6.93	4.53	7.05	4.51
The years of schooling of the father	7.79	4.53	7.78	4.55	7.81	4.52
The age of the father	44.88	13.00	46.38	12.69	47.58	12.56
The age of the mother	42.10	13.24	43.39	12.98	44.53	12.87
The employment of the mother (=1)	0.57	0.49	0.58	0.49	0.59	0.49
Household size	3.98	1.77	4.05	1.76	4.10	1.75
Children (<12 y.o.) among HH members (=1)	0.61	0.48	0.59	0.49	0.59	0.49
Elderly (>65 y.o.) among HH member (=1)	0.16	0.37	0.17	0.37	0.17	0.37
Having a housemaid/helper (=1)	0.01	0.09	0.01	0.09	0.01	0.09
Market availability in the district (=1)	0.38	0.49	0.37	0.48	0.43	0.49
The number of stores/kiosks in the district	3.57	1.54	3.60	1.54	3.77	1.44
The number of restaurants in the district	2.33	1.44	2.36	1.43	2.46	1.35
Observations	9,690		7,982		6,704	

Source: Calculated by the authors based on Susenas data. The sample observation is at the household level.

elderly member.

In terms of food supply, the presence of markets and shops does not significantly affect the proportion of FPAH and the proportion of FAFH. In contrast, the number of restaurants is negatively correlated with the demand for FAFH.

Table 4 presents the calculation of elasticity, where price elasticity and cross-price elasticity follow Equation (9) and (10), respectively, while income elasticity follows equation (11). Analyzing the overall observation, in terms of price elasticity, both FAFH and FPAH are inelastic with the elasticity of -0.83 and -0.92, indicating FAFH has higher degree of elasticity. The cross-price elasticity of FAFH on FPAH is negative, indicating that FAFH is a complementary good for FPAH. However, the cross-price elasticity of FPAH on FAFH implies that FPAH is a substitution good for FAFH, which is consistent with Park & Capps Jr (1997).

The price elasticity of FPAH is negative and less than 1, indicating that it is a normal inelastic good. A 1% increase in the price of FPAH is associated with a 0.84% decrease in its demand. For comparison, this figure is slightly higher in absolute term than the finding by Park & Capps Jr (1997) in the US, with an own-price elasticity of -0.66. The elasticity of FAFH in our study is lower than Piggott (2003) with -1.97, but higher than Reed, Levedahl & Hallahan (2005) and Huffman (2011) with -0.69 and -0.38, respectively.

When analyzing several categories of sample, we discover that the demand of the poor group for FPAH is less elastic (-0.809) compared to non-poor group (-0.842), yet the demand of the poor group for FAFH is more elastic (-1.005) than that of non-poor group (-0.912). Similar patterns are also observed between the rural and the urban groups, with larger differences. It should come as no surprise because households in the poor and rural groups are likely more dependent on staple foods, which comprise most of FPAH.

Regarding income elasticity, as examined in the overall observation, FAFH is drastically more elastic than FPAH, with a value of 2.011 as opposed to 0.715. This may suggest roughly that FPAH is a necessity good while FAFH is a luxury good, to a certain degree. Our estimate of income elasticity of FAFH is higher than Reed, Levedahl & Hallahan (2005) with 1.38 but lower than Piggott (2003) with 3.55.

Examining the income elasticity gap between FPAH and FAFH across different groups, we find varying results. The poor people are more elastic in their demand for FPAH, and the non-poor people are

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Table 3. Panel Regression Result

	The proportion of household expenditure on					
	FPAH			FAFH		
	(1)	(2)	(3)	(1)	(2)	(3)
The estimated price for FPAH	0.009**	-0.014***	-0.023***	0.003	0.065***	0.071***
	(0.003)	(0.005)	(0.005)	(0.003)	(0.005)	(0.005)
The estimated price for FAFH	-0.051***	-0.053***	-0.053***	0.064***	0.071***	0.071***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
The estimated price for tobacco	-0.031***	-0.036***	-0.049***	-0.019***	-0.006***	0.005*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
The log of real income	-0.165***	-0.194***	-0.195***	0.149***	0.230***	0.230***
	(0.003)	(0.005)	(0.005)	(0.003)	(0.005)	(0.005)
IMR for FPAH	-0.419***	-0.330***	-0.256***			
	(0.061)	(0.085)	(0.061)			
IMR for FAFH				0.061***	0.066***	0.064***
				(0.017)	(0.017)	(0.017)
The log of total consumption		0.031***	0.024***		-0.100***	-0.092***
		(0.006)	(0.006)		(0.006)	(0.006)
The years of schooling of the mother		-0.001	-0.006		0.001**	0.002**
		(0.001)	(0.004)		(0.001)	(0.001)
The years of schooling of the father		-0.001	-0.005		-0.001	0.000
		(0.001)	(0.004)		(0.000)	(0.000)
The age of the mother		0.001***	-0.005*		-0.001*	0.000
		(0.000)	(0.003)		(0.000)	(0.000)
The age of the father		0.006	0.00		-0.001**	-0.001
		(0.003)	(0.003)		(0.000)	(0.003)
The employment of the mother		0.000	0.000		-0.006**	-0.005*
		(0.004)	(0.000)		(0.003)	(0.003)
Household size		-0.016*	0.000		0.022***	0.022***
		(0.002)	(0.000)		(0.002)	(0.002)
Children (<12 y.o.) among HH members (=1)		-0.016***	-0.016***		0.017***	0.013***
		(0.002)	(0.002)		(0.005)	(0.005)
Elderly (65> y.o.) among HH members (=1)		-0.003	-0.001		-0.004	0.012***
		(0.003)	(0.003)		(0.005)	(0.003)
The presence of a housemaid		0.007	0.006		-0.012	-0.012
		(0.013)	(0.013)		(0.012)	(0.012)
Market availability in the district (=1)		0.006	0.002		0.001	-0.001
		(0.005)	(0.005)		(0.001)	(0.005)
The number of stores/kiosks		0.001	0.00		-0.003**	-0.003**
		(0.001)	(0.001)		(0.001)	(0.001)
The number of restaurants		0.002	0.001		-0.101***	-0.003**
		(0.001)	(0.001)		(0.006)	(0.001)
Entity fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	No	No	Yes	No	No	Yes
Observations	19676	19676	19767	18730	18730	18730
Adjusted R-square	-0.143	-0.131	-0.115	-0.181	-0.138	-0.1253

Source: Estimated by the authors based on Susenas, 2011–2013

Note: Standard errors are in parentheses. ***significant at 1%, ** significant at 5%, * significant at 10%. The sample observation is at household level.

more elastic in their demand for FAFH. This finding is related to Yu & Abler (2009) that the sensitivity of income is greater in staple foods than in luxury foods. It does not completely imply that people do not shift their consumption from staple to luxury; instead we can interpret that the shift to higher quality of food in FPAH group is larger than the shift toward higher quality of food in the FAFH group. However, due to data limitation, we cannot disentangle the quality effect in this issue.

The income elasticity of FAFH of households in urban areas is higher than in rural areas. It is consistent with Thiele & Weiss (2003) who argue that an increase in income causes households to consume more varied types of food. Furthermore, interestingly, the lowest income elasticity value of FPAH (0.593) and the highest income elasticity value of

Table 4. Price and Income Elasticity

Elasticity	Class	Demand for FPAH	Demand for FAFH
Price of FPAH	Overall	-0.839	0.171
	Poor	-0.809	0.099
	Non-poor	-0.842	0.180
	Urban	-0.836	0.242
	Rural	-0.986	0.090
	Male head of household	-0.838	0.168
	Female head of household	-0.907	0.357
Price of FAFH	Overall	-0.922	-0.920
	Poor	-0.879	-1.005
	Non-poor	-0.939	-0.912
	Urban	-0.868	-0.946
	Rural	-0.635	-0.972
	Male head of household	-0.941	-0.906
	Female head of household	-1.167	-0.883
Income	Overall	0.715	2.011
	Poor	0.815	1.967
	Non-poor	0.705	2.030
	Urban	0.635	1.978
	Rural	0.975	1.691
	Male head of household	0.715	2.034
	Female head of household	0.593	2.213

Source: Estimated by the authors based on Susenas, 2011–2013

Note: The figures represent a percentage change of response in demand due to 1% change in price or income. The demand is categorized as elastic if its absolute value is greater than 1 and inelastic if less than 1.

FAFH (2.213) are observed in the group of households with female heads.

5. Conclusion

In exploring household food demand, we classified consumption into two large categories: FPAH and FAFH. We aim to estimate the demand for both categories and calculate their respective elasticity. Our data indicate that households primarily allocate their expenditure to FPAH, and the proportion remains stable across the observed years. Our estimates on the price elasticity of FPAH and FAFH are -0.839 and -0.920, respectively. The cross-price elasticity estimation suggests that FAFH is a complementary good for FPAH, but FPAH is a substitution good for FAFH. Regarding income elasticity, our analysis reveals that FPAH is roughly a necessary good while FAFH is a luxury good. Households show stronger responses in the consumption of FAFH when their own price or income changes, especially when the head of household is female.

This study carries several implications for both academic literature and policymaking. Implementing price incentives that render healthier options more affordable may encourage individuals to choose cooking at home over frequently consuming FAFH. Such incentives should consider different responses by different types of households. Moreover, policies can incentivize companies to provide communal kitchens, cooking classes, or healthy meal options in on-site cafeterias. Furthermore, policies should address food deserts and ensure access to affordable and nutritious food options in both urban and rural areas. Improving access to fresh products and lean protein sources can encourage individuals to cook more at home, rendering healthy choices easier and more accessible.

The limitations of this study are as follows. Our analysis on FAFH is built upon the assumption that it is homogenous. Households may have different preferences on different types of FAFH, for instance, full-service meal and fast food, which may also have different health implications. The period used in this study may not represent current consumption. The recent technological development, particularly in

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e-commerce, delivery, and labor dynamics, may have transformed the way people eat food. Further studies are needed to cover these issues with more updated data. Another limitation is that, due to data availability, our study used an approximation of food prices, which may not be perfect. Future studies can use retail prices in the market.

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