

**Consumption Patterns for Fresh Fruits and Vegetables from different  
Retail Outlets among Urban Households in Thailand<sup>1</sup>**

**Rattiya Suddeephong Lippe<sup>2</sup> and Somporn Isvilanonda<sup>3</sup>**

<sup>2</sup> Department of Agricultural and Resource Economics  
Faculty of Economics, Kasetsart University, Bangkok 10210 Thailand  
E-mail: [g4987001@ku.ac.th](mailto:g4987001@ku.ac.th)

<sup>3</sup> Department of Agricultural and Resource Economics  
Faculty of Economics, Kasetsart University, Bangkok 10210 Thailand  
and currently a senior fellow of Knowledge Network Institute of Thailand (KNIT).  
E-mail: [fecospi@ku.ac.th](mailto:fecospi@ku.ac.th)

**Contributed paper prepared for presentation at the International Symposium  
“Sustainable Land Use and Rural Development in Mountainous Regions of Southeast Asia”,  
Session: Integration of highland farmers into markets. Hanoi, Vietnam, 21-23 July 2010**

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<sup>1</sup> This is a part of the first author's Ph.D. thesis in Agricultural Economics, Graduate School, Kasetsart University, Bangkok, Thailand.

## **Abstract**

The food retail sector in developing countries has started to undergo a restructuring process in recent years because of changes in purchasing habits of consumers, especially those in urban areas. Modern retail outlets have been growing and expanding. This has had an effect on the competitiveness of traditional markets and the production patterns of, particularly, high-value food commodities. This phenomenon is being driven by economic growth, urbanization, increasing consumer attention to and concern with food safety, quality and health attributes of food, and the liberalization of foreign investment regulations. In Thailand, the fresh markets are traditional places for food items and continue to be a major outlet for fresh fruits and vegetables. Their continuing importance is related to the nature of the supply chain for these perishable produce. However, many consumers have begun to patronize modern retail outlets because of convenience, the wide variety of products on offer, and their reputation for safe and quality products. This reputation has been earned by their strategies to control the process of setting safety and quality standards. The growth of supermarkets, hypermarkets and specialty shops is linked with consumption patterns and households' purchasing decision. Understanding the factors that influence consumption and purchasing behaviors would thus provide better information for the formulation of agricultural policies that foster development of market demand through local food producers and traders. In this regard, we analyzed the consumption patterns for fresh fruits and vegetables and the determinants of purchasing decisions of urban households as differentiated by the choice of retail outlets. We estimated the demand parameters by employing the Linear Almost Ideal Demand System (LAIDS). LAIDS was constructed in a two-stage demand system by incorporating a demographic translating function and explicitly accounting for censored data. The binary choice model was used to identify determinants in the purchase fresh fruits and vegetables from modern retail outlets. The analysis was made based on a consumer survey of 500 households in urban areas of Bangkok, the capital, and Chiang Mai, the largest city in the Northern region of Thailand. The demand for fruits and vegetables from modern retail outlets increased more with increasing income than the demand for produce from traditional retail outlets. Urban households are more price-responsive to fresh produce from modern retail outlets. Decision to purchase fresh produce from modern retail outlets is driven by household income and educational level of household head. Consumer confidence in quality products solely obtained in supermarkets and specialty stores was a positive and significant factor in purchasing fresh produce from modern retail outlets; this was linked to the health attributes of safe and quality food. Our findings show that economic development and policies that foster income growth and improve the education of the population would continue to drive the restructuring of the food retail sector. The implication of our findings for traditional retailers is to raise their competitiveness by improving customer convenience, offering a wider variety of produce and adopting safety and quality standards for fresh produce. Modern retailers could enhance their reputation by contributing to improvements in the production of premium standards to reach high-class consumers. Local producers can better access high-value supply chains by providing them technical assistance on improved crop production for higher yields, better management practices that focus on product quality and safety, and farm business management and marketing that enable higher margins.

## **Acknowledgements**

This study was financially supported by the German Research Foundation (DFG) as part of the special research program SFB 564, The Upland Programs. The authors would like to thank Prof. Dr. Matin Qaim for the invaluable suggestions and comments.

## **Background and Justification of the Study**

The food marketing systems in developing countries are rapidly transforming on both demand and supply sides. Economic growth, urbanization, modern lifestyles and globalization have led to a change in consumers' preference, away from staples towards high-value agricultural products (Pingali, 2007). The most rapid changes are in the perishable commodities, such as meat and fish, which have high income elasticity of demand but also in higher value products, like fruits and vegetables (Gulati et al., 2005). Quality and safety attributes now play an increasing role in domestic and international food trade. Rising health consciousness and environmental concerns has bundled nutrition, safety and quality of food and the way the food has been farmed or produced, processed and transported into the purchasing decision of consumers. The demand for horticultural products particularly vegetables has become more differentiated in terms of safety, quality and convenience (Johnson *et al.*, 2008). This trend has emerged in developed countries and is now increasingly common in growing urban areas of developing and transitional countries (Pingali, 2007). An increasing demand for processed and convenience food has also contributed to this trend (Unnevehr, 2003). The diversification of fresh produce with specific quality attributes is a challenge for supply side actors to increase their returns from value addition. Value addition presents an opportunity for sustainable income growth in the agricultural sector especially for small scale farmers when integrated with other marketing mechanisms (BIRTHAL *et al.*, 2005; Eaton and Sheperd, 2001).

In food supply system response, the changes in consumer demand have led to an ongoing re-structuring of the production and retail sectors (Pingali, 2007). Small-scale farmers could use opportunities to raise their income by participating in the growing market for high-value agricultural food. On the other hand, changes in consumers' preferences pose challenges to small-scale farmers as the vertical linkages in supply chain sometime exclude small farmers as they cannot satisfy new demand in terms of quality and safety aspects (Gulati et al., 2005). Likewise, demand for safety and quality fresh produce has spurred retailers into devising strategies to meet the new market demand. The growing demand for high value food diversity can not be solely met by traditional food supply chain; it requires the modernization of food retail sector (Pingali, 2007). New retail format such as supermarkets and hypermarkets have been paying increasing attention to develop their range of fresh fruits and vegetables as well as processed food to meet a growing demand. The share of fresh fruits and vegetables in modern retailer outlets is still relatively low compared to wet markets but it is increasing (Schipmann, 2010 cited Reardon and Berdegue, 2002).

In Thailand, traditional retail outlets like the wet markets still account for the majority of expenditure on fresh produce such as fresh fruits and vegetables (FFV), meat and fish (Gorton et al., 2009). Thai consumers perceive that products at wet markets are cheaper and fresh (USDA, 2004). However, the growing shelf-space for fresh fruits and vegetables is a sign that modern retail outlets have received increasing importance in Thai consumers' spending (Wiboonpongse and Sriboonchitta, 2004). Multinational retailers have been establishing supermarkets to serve the growing domestic demand for fruits and vegetables (Pingali, 2007). Modern retail formats have some competitive advantages over traditional markets, the two important ones being convenience and product quality. They have implemented strategies to further upgrade product and signal some kind of quality to consumer by attaching a label or brand name, and offer a wide variety of products (Schipmann, 2010 Jitsanguan et al., 2004; Oates, 2006; Boselie et al., 2003). The competition at the retail level has impacted on the composition and competitiveness of the traditional food retail outlet. This is also having influences on the upstream players of the market chain such as the farmers and post harvest processors. It is therefore important for the country's supply chain actors to know and understand the shifts in demand patterns and the underlying determinants of the changes. Such understanding would provide better information for the formulation of agricultural policies that foster development of market demand through local food producers and traders. As yet, only a few studies have dealt with demand for high value agricultural food disaggregated by place of purchase or consumer choice of retail outlets (Chamhuri and Batt, 2009; Gorton et al., 2009; Mergenthaler 2009). Therefore, information for agricultural food producers and retailers does not exist that would achieve and strengthen their competitiveness; this is a research gap.

To address part of this research gap, this study analyzed the consumption patterns for fresh fruits and vegetables and the determinants of purchasing decisions of urban households as differentiated by

the choice of retail outlets, particularly on modern retail markets. The analysis was based on information and data collected through a consumer survey of 500 households in urban areas of Bangkok, the capital, and Chiang Mai, the largest city in the Northern region of Thailand. The paper proceeds as follows: In section 2, the methodology framework is described, followed by the discussion of findings in section 3, and the conclusion in section 4.

## Methodology

### Study model

Theoretically, food consumption patterns can be reflected by the demand responsiveness to the change of income and prices and the effect of other individual characteristics. The common approach to assess consumer behavior is to use the concept of separable preference by stepwise budgeting. This study utilized a two-stage budgeting model with a utility tree, illustrated in Appendix Figure 1. At the first stage, total household expenditure is assumed as the allocation of available budget into three broad group items, namely, food-at-home, food away from home and non-food. The group expenditure elasticity is derived in the absence of price information, employing the Working-Leser Model (Working, 1943; Leser 1963). In the second stage budgeting, available-food-at-home expenditure is allocated to 8 fresh and preserved food commodity groups. These include purchased fresh fruits and vegetables from traditional retail outlets (FFV-traditional), purchased fresh fruits and vegetables from modern retail outlets (FFV-modern), rice and glutinous rice (RG), meat, fish and seafood (FS), other fresh food (OFF), preserved fruits and vegetables (PFV) and other preserved food (OPF). In this stage, the approximated Linear Almost Ideal Demand System (LAIDS) was applied to derive conditional price and non-price elasticities. The approach proposed by Shonkwiler and Yen (1999) was employed to account for the problem arising from censored data (household zero consumption for some food items). The transformed expenditure share equation for food items at the second stage budgeting can be illustrated as:

$$(1) \quad w_{ih} = \Phi(z_i' \hat{\alpha}) [\alpha_i^* + \sum_{j=1}^n \gamma_{ij} \log p_{jh} + \beta_i \log \left( \frac{x_h}{P_h^*} \right) + \sum_{r=1}^n \delta_{ir} \eta_{rh}] + \varphi \hat{\phi}(z_i' \hat{\alpha}_i) + \xi_i$$

where  $\phi(z_i' \hat{\alpha})$  and  $\Phi(z_i' \hat{\alpha})$  denote univariate standard normal probability function and  $\Phi(z_i' \hat{\alpha})$  the associated cumulative distribution function, which are formed using the estimated parameters from the probit purchase decision model.  $w_{ih}$  is budget share for food item  $i$  expressed as a ratio of food at home

expenditure ( $i = 1, 2, \dots, 8$ ).  $p_{jh}$  is the price of food item  $j$ .  $\frac{x_h}{P_h^*}$  is the annual per capita food at home

expenditure deflated by Tronqvist Price Index.  $P_h^*$  is the Tronqvist Price Index.  $\xi_i$  is an error term and  $\alpha_i, \gamma_{ij}, \beta_i, \delta_{ir}$  are parameters to be estimated and  $\eta$  denotes the vector of household characteristics

In the demand system estimation, the error term across equations are correlated by the fact that dependent variables (share of food item) need to satisfy the budget constraint. Hence, both stages will be estimated with the Seemingly Unrelated Regression (SUR) (Zellner, 1962). To preserve the adding-up restriction, one expenditure share equation has to be dropped from the system (Non-food and OPF share equations for first and second budgeting stages, respectively). Additionally, symmetry and homogeneity restrictions across equation are imposed in the second stage estimation. The error terms are heteroskedastic, consequently the covariance matrix of second-step estimator is incorrect (Halcoussis, 2005; Sadoulet and Janvry, 1995). Bootstrapping estimation is used for inferences about the estimated parameters (Lippe *et al.*, 2010a; Lippe *et al.*, 2010b, Alfonzo and Peterson, 2006; Su and Yen, 2000).

Further analysis was made to identify the determinants of fresh fruits and vegetables purchasing decision from modern retail sectors. Consumer's choice can be described based on utility maximization (Maddala, 1983). The chosen destination must give a consumer greater utility compared to others. In this application, if consumer purchases FFV from modern retailers (FFV-modern), it implies that the utility of buying FFV-modern ( $u_{11}$ ) is greater than that of not buying FFV-modern ( $u_{i0}$ ). The impact of change in explanatory variables on the probability of the decision to purchase or not to purchase FFV-modern can be specified in the primary econometric model as:

$$(2) \quad y_{ih} = \beta x_i + \varepsilon_{ih}$$

$y_{ih}$  is the binary response of consumer which takes on two possible values.  $y_{ih}$  takes the value 1 if the event happens (purchase FFV-modern<sup>2</sup>) otherwise it is zero.  $x_i$  is vector of explanatory variables that are hypothesized to influence households purchasing decision and  $\beta$  is conformable vector of parameter. Assume that the error term has a logistic distribution; the probability that observed value  $y$  takes the value 1 is expressed as:

$$(3) \quad P(y = 1) = \frac{\exp(\beta x)}{1 + \exp(\beta x)}$$

The coefficient estimation is based on Maximum Likelihood technique. For useful interpretation, marginal effects are estimated at the sample mean by first derivative in the predicted probability that  $y_{ih}$  being 1 on a unit change in explanatory variable (Green, 2003).

### **Data**

Usually, urban areas play a leading role in the food system transformation of a country (Pingali, 2007), as urban households in general have a higher purchasing power than those in rural areas. In this regard, the interview-based survey of Thai households in Bangkok and Chiang Mai was employed on a sample of urban household respondents. A multi-stage sampling technique was employed in order to assure the representation of all major income household levels including those in remote areas. The survey was conducted between April and July, 2007. Household heads and primary food purchasers were asked for detailed information on consumption expenditures on food and non-food items. The questionnaire format was open-ended to allow recording of the household's descriptions of consumption patterns particularly on items for fresh and processed food at home items. Specific question on location of purchase fresh fruits and vegetables was considered including product price and quantities. Questions on household characteristics and their attitudes toward safety and quality aspects, which were expected to impact on consumers' behaviors, were asked of household heads.

The empirical analysis was applied on selected household characteristics used in the demand estimation and binary purchasing choice model; these are presented in Appendix Table 1. Average annual per capita expenditure was 110,934 baht (3220 US dollars). The educational level of household head is measured in years of schooling, which average is 10.2 years and shows the different levels between poorest and richest quartiles. Share of female labor force participation slightly exceeds 50 percent, referring to an important food demand driver, which is included as a dummy variable. The occupation of household head was divided into three groups. Most household respondent were housewives mainly staying at home. The prevalence of long-term diseases among household members is quite high: 41 percent of household respondents indicated that some members of the family were suffering from a long-term ailment. In addition, 93 percent of the household respondents know that some health problems are linked to food safety and quality. For fresh fruits and vegetables, household respondents were asked additional questions on safety and quality aspects. About 41 percent of household respondents agreed that safe and quality fresh fruits and vegetables can be obtained only in modern retail outlets. For consumers' purchasing decision, safety from pesticide and synthetic chemicals has been used as criterion by 43 percent in our sample.

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<sup>2</sup> Assuming that household that reported expenditure consumption on FFV-modern category being greater than zero, dependent variable of binary response is equal to 1.

## Discussion of findings

### **Consumption pattern on fresh fruits and vegetables**

The demand parameters for disaggregate fresh fruits and vegetables (FFV-Traditional and FFV-modern) for the food-at-home group is estimated at the second budgeting stage, including other 6 aggregate food items (Appendix Table 2). All expenditure share equations are significant at least at 10 percent significance level according to chi-square test. The logarithm term of per capita food-at-home expenditure are statistically significant for purchased FFV from traditional and modern retail outlets, rice & glutinous rice, meat, fish and seafood. A different sign of demand parameters indicates that if food-at-home expenditure rises by 10 percent, expenditure share of purchased FFV from traditional retailers tends to decrease by 0.6 percent, and the share of purchased FFV from modern retailers would increase by 0.2 percent. Most own-price coefficients are also statistically significant at least at 10 percent level. Household size has a statistically negative impact on the share of purchased FFV from traditional retailers, other fresh food and preserved fruits and vegetables, reflecting the decreasing share of these commodities as household size increases. In contrast, household size exhibits a positive impact on rice & glutinous rice and fish & seafood. The estimated coefficient for educational level of household head is positive and highly significant for purchased FFV of modern retailers, which is in line with the assumption that better-educated household heads tend to buy more fresh produce from modern retail outlets. However, demand for FFV from traditional retailers is likely to decrease with the higher educational level of household head. Geographic location dummy shows a negative sign for FFV from traditional trade, while it positively impacts on the FFV demand from modern retailers. This result reflects the different levels in the development of modern retail sectors in Bangkok and Chiang Mai. Bangkok's food retail sector is much more advanced with respect to the density of modern retail outlets. Additionally, the attitude dummy for consumers agreeing that quality and safety FFV are solely obtained in supermarkets and speciality stores has a significantly positive impact on the share of FFV from modern retail outlets.

The disaggregate demand elasticities of fresh produce with respect to continuous variables are calculated based on the formulas provided by Green and Alston (1990). Using the estimated coefficients on the logarithm of food at home expenditure, own-price, education year and the average budget share, all resulting expenditure, own-price and education elasticities have the expected sign (Table 1). The estimated unconditional expenditure (income) elasticities for each disaggregate FFV are calculated by corresponding conditional expenditure elasticity of disaggregate FFV multiplied by food-at-home expenditure elasticity at the first budgeting stage (0.52). In comparison, income elasticity for FFV from the modern sector is higher than those from the traditional one. This suggests a substantial improvement in FFV from modern trade which is supposed to be higher in safety and quality attributes as household income increases. For the own-price elasticities, notable differences are observed in different food retail sectors. As expected, absolute value is higher for more expensive fresh produce from modern retailers. The education elasticity indicates that education significantly influences demand for FFV from modern retail outlets. Education has an influence on the lifestyle of consumers and thus would induce a change in consumers' preferences. This result is much in line with the findings that modern retailers have especially penetrated the higher educated and younger consumer groups (Gorton et al., 2009).

Table 1 Annual per capita consumption (kilogram) and demand elasticities of fresh fruits and vegetables

Description	Fresh Fruits and Vegetables (FFV)	
	Traditional retail outlets	Modern retail outlets
Annual per capita consumption (Entire sample)	183.2	28.6
Household income level <sup>a</sup> 1	136.5	10.8
Household income level 2	207.9	18.2
Household income level 3	176.5	31.3
Household income level 4	221.2	54.1
Elasticities		
Conditional expenditure elasticity	0.77	1.35
Income elasticity	0.40***	0.70**
Marshallian price demand elasticity	-0.65***	-1.10
Education elasticity	-0.09*	1.19***

Note: <sup>a</sup> Household income level is assigned by expenditure quartile, consisting 125 households each.

\*, \*\*, \*\*\* Estimates are significant at the 10%, 5% and 1% level, respectively.

Source: Estimated based on household survey data

### **Purchasing decision estimate**

In the purchasing decision model, the dependent variable is a binary variable being one if household purchased fresh fruits and vegetables from modern retail outlets and zero otherwise. Table 2 presents the regression results including the marginal effects of the explanatory variables on the probability of purchasing fresh fruits and vegetables from modern retailers. Overall, the sign estimate coefficients are in accord with our expectation and consistent with what was found in the demand analysis. Households with higher income and educational levels are inclined to purchase FFV-modern than those low income households and years of schooling. As expected, the female labor force participation variable yields a statistically significant positive impact on the purchasing decision on FFV from supermarkets. This would relate to the cost of time and the convenient shopping amenities such as providing car park, trolleys, and baskets. Additionally, consumers do not only purchase fresh produce in the supermarkets, but also other kinds of food and non-food items. However, the dummy variables for occupation<sup>3</sup> seem to contradict our expectation as the estimation presents a significant negative effect on purchased fresh produce from modern trades. There are a number of possible explanations: the high price of fresh produce in the modern trade might be a burden for consumers who receive a monthly income; shoppers do not always live near supermarkets so that they would simply walk to and purchase fresh produce in the traditional market close by (Chamhuri and Batt, 2009). Households in Bangkok purchased more fresh fruits and vegetables from modern trades than those in Chiang Mai. Households concerned about safety tend to purchase more fresh produce from modern retail outlets, implying that they are more confident of the safety of the fresh produce in these outlets.

The impact of a unit change in each of explanatory variable on the probability to purchase fresh produce from modern trade can be explained through the marginal effects magnitude ( $dy/dx$ ). An increase in annual disposable income and years of education of household head by 1 percent would increase the probability of purchasing FFV-modern by 8.75E-05 and 2.4 percent, respectively. A female household head who participates in the labor force has a 9.8 percent higher probability of purchasing FFV-modern than one who is unemployed. Urban households in Bangkok are more likely to purchase these fresh produce than those in Chiang Mai by 14.2 percent. Safety from pesticide and synthetic chemicals has been a criterion for consumers' purchasing decisions, which raises the probability of their purchasing fresh fruits and vegetables from modern retailers by 11 percent.

Table 2 Logistic estimation for purchasing decision of fresh fruits and vegetables from modern retail outlets

Variable	Coefficients	Standard error	dy/dx
Annual per capita expenditure (TE)	0.0000***	1.17E-06	8.75E-07
Education (year)	0.1058***	0.0236	0.0239
Age	0.0117	0.0073	0.0026
Female labor	0.4371*	0.2290	0.0979
White collar	-0.6444**	0.3229	-0.1331
Workers	-0.9604***	0.2509	-0.2070
Bangkok	0.6481***	0.2175	0.1423
Safety criteria	0.4838**	0.2058	0.1098
Disease	0.4269**	0.2100	0.0971
Constant	-3.2652***	0.5884	
Log-likelihood	-288.22		
LR chi2	79.24		
Probability (y/x) y = 1	0.34		

Note: \*, \*\*, \*\*\* Estimates are significant at the 10%, 5% and 1% level, respectively.

Source: Estimated based on household survey.

<sup>3</sup> Dummy variable of housewife is a base reference in this estimation.

## Conclusion

The transformation happening in the food sector makes it crucial to understand the consumption patterns and their underlying determinants for fresh fruits and vegetables differentiated by place of purchases. This understanding is a prerequisite for local food producers and retailers to develop effective strategies to meet changing demand patterns. It is also an important guide for the design of food and agricultural policies. Overall, the estimated demand elasticities from this study conform to expectations. The demand for fruits and vegetables from modern retail outlets increased more with increasing income than the demand for produce from traditional retail outlets. Urban households are more price-responsive to fresh produce from modern retail outlets. Decision to purchase fresh produce from modern retail outlets is driven by household income and educational level of household head. Consumer confidence in quality products solely obtained in supermarkets and specialty stores was a positive and significant factor in purchasing fresh produce from modern retail outlets; this would be linked to the health attributes of safe and quality food.

Our findings show that economic development and policies that foster income growth and improve the education of people would likely spur domestic demand for fresh fruits and vegetables, particularly on the basis of product safety and quality. This would lead to the restructuring of the food retail sector. The implication for traditional retailers is to raise their competitiveness by improving customer convenience, offering a wider variety of produce and adopting safety and quality standards for fresh produce. Modern retailers, on the other hand, could enhance their reputation by contributing to improvements in the production of premium standards to reach high-class consumers. Efficiency gains through economy of scale and with various cost-efficient strategies and practices enable modern retailers to reduce prices. This would result in a disproportionate increase in the demand for fresh fruits and vegetables from modern retail sector. However, local producers can better access high-value supply chains by providing them technical assistance on improved crop production for higher yields, better management practices that focus on product quality and safety, and farm business management and marketing skills that enable higher margins.

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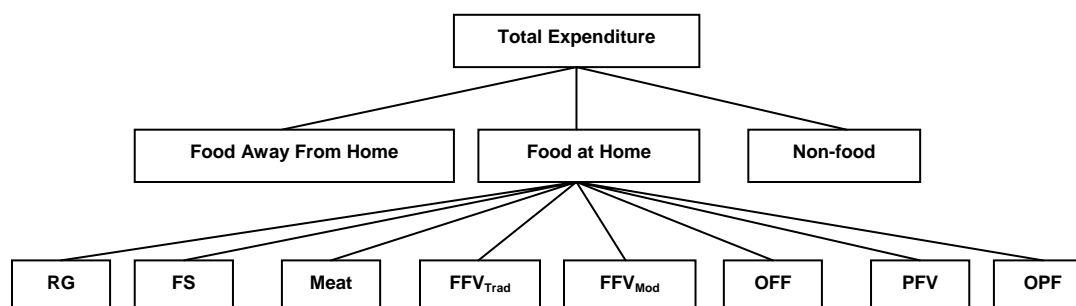
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## Appendix

Appendix Figure 1 Utility tree of two-stages budgeting for disaggregate demand



Note FFV<sub>Trad</sub> and FFV<sub>Mod</sub> are fresh fruits and vegetables from traditional and modern retail outlets, respectively.

Appendix Table 1 Household characteristics

Variables	Definition	Entire Sample	Poorest quartile	Richest quartile
TE	Annual per capita total household expenditure	110,934.50	40,214.19	236,221.20
FAH	Annual per capita food at home expenditure	19,783.48	12,074.55	28,811.50
Size	Household size (person)	4.3	5.2	3.8
Age	Age (year)	49.2	50.5	44.8
Education	Education of household head (year)	10.2	8.0	12.8
Female labor	Dummy for female participation in labor force (%)	53.4	52.8	51.2
White collar	Dummy for white collar jobs (%)	14.2	9.6	21.6
Workers	Dummy for workers or entrepreneurs (%)	39.6	36.8	40.0
Housewife	Dummy for housewives (%)	46.2	53.6	38.4
Distance	Distance to the supermarket (km.)	2.6	2.5	3.1
Attitude	Quality & safety FFV are only in the modern retailers (%)	41.2	36.8	52.8
Health awareness	Dummy of awareness of health problems linked to food quality (%)	93.4	91.2	96.8
Disease	Dummy for household members being affected by long-term diseases (%)	41.0	41.6	36.8
Safety criteria	Dummy variable for household heads use safety criteria for purchasing decision (%)	43.2	40	53.6

Note: Calculated from household survey data.

Source: Estimated based on household survey.

Appendix Table 2 Demand Estimate for food at home commodities

	FFV- Traditional	FFV- Modern	Rice	Meat	FS	OFF	PFV	OPF
<b>FAH expenditure (log)</b>	-0.0573***	0.0170**	-0.0567***	0.0303***	0.0311***	0.0162	0.0051	0.0143
	0.0160	0.0075	0.0091	0.0070	0.0106	0.0134	0.0063	
<b>Price-traditional FFV (log)</b>	0.0720***	-0.0025	-0.0090	-0.0060	-0.0256***	-0.0097	-0.0038	-0.0154
	0.0172	0.0155	0.0059	0.0069	0.0082	0.0096	0.0050	
<b>Price-Modern FFV (log)</b>	-0.001	-0.0040	-0.0027	0.0038	0.0001	0.0004	0.0012	0.0022
	0.0058	0.0092	0.0036	0.0036	0.0031	0.0032	0.0020	
<b>Price-RG (log)</b>	-0.0088	-0.0071	0.0560***	-0.0087	-0.0136***	-0.0147**	0.0049*	-0.0079
	0.0058	0.0095	0.0106	0.0068	0.0046	0.0060	0.0025	
<b>Price-Meat (log)</b>	-0.0056	0.0094	-0.0084	0.0093	-0.0054	0.0096	0.0081***	-0.0170
	0.0065	0.0091	0.0066	0.0084	0.0055	0.0068	0.0032	
<b>Price-FS (log)</b>	-0.0226***	0.0003	-0.0123***	-0.0051	0.0720***	-0.0037	-0.0052	-0.0236
	0.0072	0.0072	0.0041	0.0051	0.0084	0.0065	0.0038	
<b>Price-OFF(log)</b>	-0.0101	0.0011	-0.0156**	0.0106	-0.0043	0.0333*	0.0033	-0.0183
	0.0100	0.0088	0.0064	0.0075	0.0077	0.0196	0.0075	
<b>Price-PFV (log)</b>	-0.0037	0.0030	0.0048*	0.0082***	-0.0057	0.0030	0.0024	-0.0121
	0.0048	0.0050	0.0025	0.0032	0.0041	0.0069	0.0022	
<b>Price-OPF (log)</b>	-0.0202	-0.0002	-0.0127**	-0.0122**	-0.0176**	-0.0184**	-0.0108**	0.0921
	0.0124	0.0109	0.0053	0.0051	0.0077	0.0084	0.0050	
<b>Size (log)</b>	-0.0775***	-0.0030	0.0150*	-0.0051	0.0306**	-0.0172*	-0.0165**	0.0737
	0.0161	0.0085	0.0088	0.0074	0.0152	0.0091	0.0078	
<b>Education years (log)</b>	-0.0023*	0.0057***	0.0003	0.0010	-0.0027*	0.0014	0.0005	-0.0039
	0.0014	0.0022	0.0005	0.0007	0.0015	0.0010	0.0006	
<b>Female labor</b>	-0.0103	0.0040	0.0051	-0.0110*	-0.0021	0.0215**	0.0043	-0.0115
	0.0136	0.0230	0.0055	0.0061	0.0116	0.0102	0.0062	
<b>Bangkok</b>	-0.0366***	0.0065	0.0240***	0.0240***	0.0117	-0.0191*	-0.0065	-0.0040
	0.0133	0.0275	0.0056	0.0076	0.0106	0.0098	0.0066	
<b>Age</b>	0.0008**	0.0002	0.0007***	-0.0002	0.0003	0.0005	-0.0004**	-0.0021
	0.0004	0.0007	0.0002	0.0002	0.0004	0.0003	0.0002	
<b>Distance to supermarket</b>	-0.0037	0.0083	-0.0004	-0.0001	-0.0043**	0.0017	0.0003	-0.0019
	0.0027	0.0054	0.0011	0.0012	0.0019	0.0025	0.0010	
<b>Media used</b>	0.0033	-0.0140*	0.0025	-0.0038*	0.0047	0.0031	0.0023	0.0017
	0.0047	0.0077	0.0017	0.0019	0.0037	0.0034	0.0017	
<b>Attitude</b>	-0.0230**	0.0851***	-0.0034	0.0003	-0.0035	-0.0076	0.0016	-0.0494
	0.0111	0.0248	0.0044	0.0057	0.0105	0.0096	0.0054	
<b>White collar</b>	-0.0099	-0.0415	0.0041	-0.0030	-0.0010	0.0536***	0.0033	-0.0055
	0.0211	0.0368	0.0076	0.0086	0.0178	0.0189	0.0097	
<b>Workers</b>	0.0108	-0.0159	-0.0054	0.0022	0.0110	-0.0082	0.0021	0.0035
	0.0160	0.0345	0.0057	0.0061	0.0116	0.0085	0.0074	
<b>Probability function</b>	-0.2047**	-0.0381	-0.0380	-0.1991***	0.0424		-0.1528**	0.5903
	0.0904	0.0950	0.0509	0.0410	0.0947		0.0609	
<b>Constant</b>	0.9992***	-0.1304***	0.6322***	-0.1924***	-0.2749**	-0.0249	0.0489	-0.0577
	0.1656	0.0489	0.0982	0.0678	0.1227	0.1359	0.0734	
<b>Chi2</b>	135.09	110.80	410.26	69.41	137.14	81.59	43.69	

Note: \*, \*\*, \*\*\* Estimates are significant at the 10%, 5% and 1% level, respectively.

Source: Estimated based on household survey.