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Household Food Consumption in Rural, Cambodia Almost Ideal Demand System Analysis

Sar Sary[1,2,3,a], Xu Shiwei[1,2,*], Yu Wen[1,2,b], Siek Darith[3,c], Sophannak Chorn[4,d]

[1]Agricultural Information Institute, Chinese Academy of Agricultural Sciences, Beijing, China
[2]Key Laboratory of Digital Agricultural Early-Warning Technology, Ministry of Agriculture, Beijing, China
[3]Regional Polytechnic Institute TechoSen Battambang, Ministry of Labor and Vocational Training, Battambang, Cambodia
[4]Department of International Studies, Institute of Foreign Languages, Royal University of Phnom Penh, Phnom Penh, Cambodia

*Corresponding author e-mail: xushiwei@caas.cn

[a]sarsarymc@yahoo.com, [b]yuwen@caas.cn, [c]darith9398@yahoo.com, [d]nak_chorn@ya mail.com

Abstract. This study analysis household food expenditure and food price in rural Cambodia. The study utilizes 2017 conducted survey in Takeo, Kandal and Kompong Speu province of Cambodia. 240 households were randomly selected based on the regulation and sample distribution. LA/AIDS is employed to estimate price and expenditure elasticities. The food price elasticities increase 1percent reflect commodities as well as, rice, maize, potato, egg, and vegetable will decrease 0.0909 percent, 0.0013 percent, 0.0019 percent, 0.0019percent, respectively, and meat, fruit, the drink will increase 0.0378 percent, 0.0057 percent, 0.0643 percent, respectively. Food expenditure amount is presented in table 3, the calculated expenditure elasticities for rice, maize, potato, egg, vegetable, meat, fruit, and drinks were 0.75, 0.82, 0.73, 0.60, 0.91, 1.08, 1.21 and 2.28, respectively. When household food expenditure increase one percent, it reflects the commodities of rice, maize, potato, egg, vegetable, meat, fruit, and drinks will increase by 0.75%, 0.82%, 0.73%, 0.60%, 0.91%, 1.08%, 1.21%, and 2.28%, respectively. The daily food people usually consume has rice, maize, potato, egg, vegetable, meat, fruit, and drinks. The rice is mostly diary consumption and also meat, vegetable.

1. Introduction

The food is essential to produce energy, stimulate growth, and maintain life [5] [6]. Food is also considered a "political" because food policy not only affects economic aspects such as food and production, but also food is closely related to politics [15]. In Cambodia the fundamental of food related food production, consumption, and supply. In the 1960s, Cambodia is sufficient food demand consumption whole nationwide, but late 1981 the civil war became this country to be deficient food consumption and supply [14].

Cambodians' agricultural products remain underdeveloped as they are threatened by a number of problems including misuses or overuses of chemical additives, pesticides, and fertilizers leading to

failure to meet regional and international standards and causing threats to public health [1]. In many cases, the quality of processed food products is low, too. Given this problem, the Ministry of Industry and Handicraft is responsible for the inspection of samples of processed foods and undertaking analysis on diverse kinds of industrial products, while the Institute of Standards assures standardized products and quality. In 2007, the Law on Standards of Cambodia has been adopted [12].

More than 80 percent of Cambodians live in rural areas, and these people usually produce at least part of their food needs. The major achievements in recent years are that Cambodia has become a sufficiently productive country, and today can meet the minimum population's demand for food. However, at the sub-national level, the balance of rice is not equal between geographical areas and socio-economic groups. The quantity increased from an average of 1.31 tons / ha in 1993 to 2.49 million ha / ha in 2006-2007, which is less than in neighboring output [2].

2. Description Data

All survey data in this study were collected by the authors and some postgraduate students from AII-CAAS, graduate students from RPITSB and UME in Takeo, Kandal and Kompong Speu province of Cambodia. 240 households were randomly selected based on the regulation and sample distribution. The survey covers various aspects of the living condition of rural farmers and housing, income, food expenditure, and goods consumption. Data procedure collection started by contacting the local authority (chief of the district, commune, and village) and then face to face interview with household farmers.

Table1 Definition and Summary Statistics of Variable use in Regression

Variable	Definition	Mean	Std. Dev.	Min	Max
w1	share expenditure rice	0.38	0.13	0.09	0.72
w2	share expenditure maize	0.01	0.01	0.00	0.03
w3	share expenditure potato	0.01	0.01	0.00	0.05
w4	share expenditure egg	0.02	0.01	0.00	0.12
w5	share expenditure vegetable	0.05	0.02	0.01	0.17
w6	share expenditure meat	0.46	0.11	0.18	0.79
w7	share expenditure fruit	0.03	0.02	0.00	0.08
w8	share expenditure drinks	0.05	0.07	0.00	0.44
lnp1	logarithm of rice price	6.80	0.12	6.55	7.09
lnp2	logarithm of maize price	7.57	0.20	6.68	8.01
lnp3	logarithm of potato price	7.58	0.30	6.68	8.29
lnp4	logarithm of egg price	8.37	0.26	7.60	9.39
lnp5	logarithm of vegetable price	7.72	0.21	7.00	8.52
lnp6	logarithm of meat price	9.66	0.11	9.31	9.96
lnp7	logarithm of fruit price	8.53	0.14	7.60	8.99
lnp8	logarithm of drinks price	8.57	0.32	7.82	10.57
lnexpfd	log total expenditure food	15.14	0.38	14.00	16.32

The information on households was also used in this analysis. Table 1 illustrate the mean logarithm total food expenditure is 15.14 percent per year. Averages share rice expenditure is 0.38 percent, the maximum is 0.72 percent, the minimum is 0.09 percent and averages share meat expenditure is 0.46 percent, the maximum is 0.79 percent and the minimum is 0.18 percent.

3. AIDS Model

In the study, data analysis is carried out with STATA's program that implements regression of FGNLS and the use of AIDS model. According to Deaton and Muellbauer (1980), AIDS compensation systems were developed to evaluate the value and sustainability of income. The AIDS

model only responds to specific mindset, but it does not reflect additional preferences and other social and economic factors. As shown in Figure 1 below, the need for food is an estimate of commodities. The shape of the curve illustrates the similarities in price sharing, which means that the linear system is almost identical to the behavior of users. The model (LA / AIDS) was introduced by Deaton and Muellbauer (1980) and was used by many scholars [16].
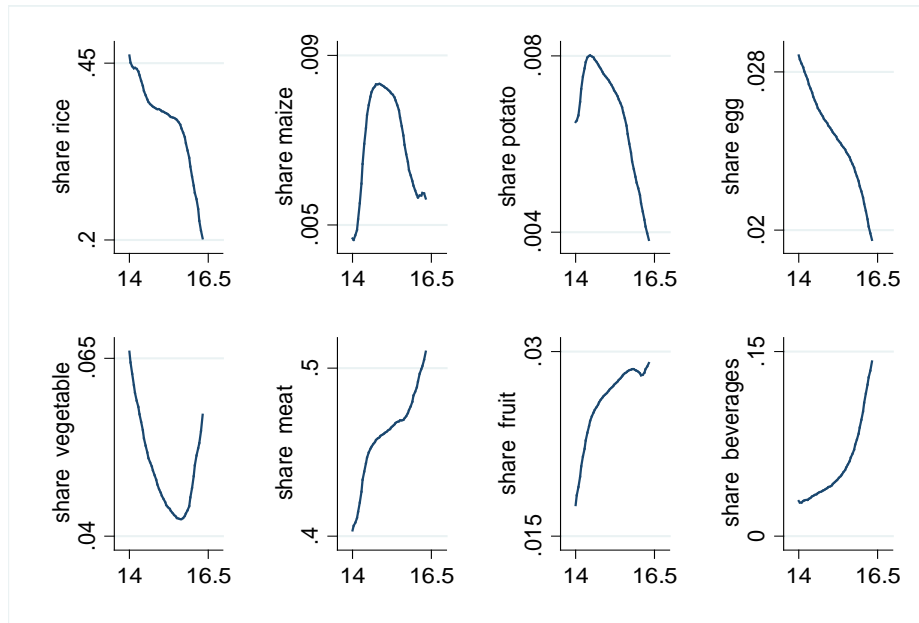

Figure 1. Engle curves Non-parametric Engle curves for share food

Fig. 1 indicates the unpredictable appraisals of our eight foods. In fact, we can consider that the shape of the curve generally indicates the shared budget. The shape of the curve does not show a clear line. These results show that budget sharing is not inexpensive, indicating that the general use of the Linear Approximate System is almost identical to client behavior in current analysis. Therefore, we have hired the model (LA / AIDS) proposed by Deaton and Muellbauer (1980), and many researchers used it to address food-related issues such as [16] [10].

AIDS diagnostic function used in this study is as follows:

$$w_i = \alpha_i + \sum_j \gamma_{ij} \ln p_j + \beta_i \ln \left\{ \frac{m}{p_{(p)}} \right\} + \mu_i \tag{1}$$

Where w_i is a household's function of expenditure goods i, $\ln p_j$ modify the logarithm of the cost paid for the goods i, m dodify total expenditure on all eight merchandise, the μ_i's regression error terms, and

$$\ln P_{(p)} = \alpha_0 + \sum_{i=1}^{n} \ln p_i + \frac{1}{2} \sum_{i=1}^{n} \sum_{j=1}^{n} \gamma_{ij} \ln p_i \ln p_j \tag{2}$$

However, the equation (2) is nonsense. To avoid complications with an off-line estimation, geometric table geometry

$$\ln P_{(p)} = \sum w_i \ln p_i \tag{3}$$

This model has to meet the following limitations:

$$\sum \alpha_i = 1, \ \sum_i \beta_i = 0, \sum_j \gamma_{ij} = 0, \gamma_{ij} = \gamma_{ji} \tag{4}$$

In the implementation of the LA- AIDS model is used more often than unprotected AIDS samples (Huang and Rozelle 1998). Approximations from the LA-AIDS model will be related to AIDS estimates, except for a period of reluctance.

Marshallian's flexibility and flexibility adjustment was calculated from the estimated parameters of the LA-AIDS model, using a near-similar approximation of the actual formula developed by Green and Alston (1990), which are given in Equations (5)–(6).

Expenditure elasticities:

$$\varepsilon_i = 1 + \frac{\beta_i}{w_i} \tag{5}$$

Marshallian (uncomensated) price elasticities:

$$\eta_{ij} = -\delta_{ij} + \frac{\gamma_{it}}{w_i} - \frac{\beta_i w_j}{w_i} \tag{6}$$
$$i = j, \delta = 1, \text{ or } \delta = 0.$$

4. Results and Discussion

4.1 Almost Ideal Demand System (AIDS) methods

The parameters Almost Ideal Demand System is presented in table 2, Base on result, when rice price increase one percent reflects the expenditure share of rice will increase 0.1575 percent, meat price increase one percent reflects the expenditure share of rice will decrease 0.1659 percent and when food expenditure increase 1percent reflect the expenditure share of rice will decrease 0.0909 percent. Egg price increase one percent reflects the expenditure share of the egg will increase 0.022 percent and when food expenditure increase one percent reflect egg the expenditure share of the egg will decrease 0.0097 percent.

Table2: Parameters of Almost Ideal Demand System

γ_{ij}	rice	maize	potato	egg	veg	meat	fruit	drinks	α_i	β_i	R-sq
rice	0.1575	-0.0038	-0.0031	-0.0040	0.0069	-0.1659	0.0018	0.0105	1.1240	-0.0909	0.9153*
maize	-0.0038	0.0064	-0.0005	-0.0020	-0.0049	0.0092	-0.0017	-0.0026	-0.0037	-0.0013	0.6944*
potato	-0.0031	-0.0005	0.0061	-0.0032	-0.0043	0.0077	-0.0011	-0.0017	0.0004	-0.0019	0.6092*
egg	-0.0040	-0.0020	-0.0032	0.0222	0.0050	-0.0083	-0.0075	-0.0023	0.0610	-0.0097	0.7856*
veg	0.0069	-0.0049	-0.0043	0.0050	0.0464	-0.0476	-0.0069	0.0054	0.1549	-0.0040	0.8496*
meat	-0.1659	0.0092	0.0077	-0.0083	-0.0476	0.0464	0.0088	0.1497	-0.2228	0.0378	0.9523*
fruit	0.0018	-0.0017	-0.0011	-0.0075	-0.0069	0.0088	0.0170	-0.0104	-0.0074	0.0057	0.7688*
drinks	0.0105	-0.0026	-0.0017	-0.0023	0.0054	0.1497	-0.0104	-0.1486	-0.1064	0.0643	-

About meat and drinks, when meat price increase one percent reflects the expenditure share of meat will increase 0.0464 percent, and also reflect the expenditure share of drinks will increase 0.1497percent. In this result show that both meat and drinks are necessary foods and complement. Whereas maize and potato, when food expenditure increase one percent reflect this food are nearly zero, so it modifies that maize and potato are not stapled foods. Including, the food price expenditure increase one percent reflect commodities as well as, rice, maize, potato, egg and vegetable will decrease 0.0909percent, 0.0013percent, 0.0019percent, 0.0019percent, respectively, and meat, fruit, drink will increase 0.0378percent, 0.0057percent, 0.0643percent, respectively.

4.2 Food Expenditure

Food expenditure elasticities were presented in table 3, the calculated expenditure elasticities for rice, maize, potato, egg, vegetable, meat, fruit, and drinks were 0.75, 0.82, 0.73, 0.60, 0.91, 1.08, 1.21 and 2.28, respectively. When food price expenditure increase one percent affect food expenditure elasticities commodities of rice, maize, potato, egg, vegetable, meat, fruit, and drinks will increase by 0.75%, 0.82%, 0.73%, 0.60%, 0.91%, 1.08% , 1.21% and 2.28%, respectively, when holding price of food items constant. The positive expenditure elasticities indicate that if total food expenditure increases, demand for all food will increases. The expenditure elasticities of rice, maize, potato, egg,

and vegetable is smaller than one implies that all of the goods are necessities and meat, fruit and drinks are bigger than one indicate that are luxury goods.

The own - price elasticity rice vary from -0.4892 for maize to -0.20. To egg, vegetable and fruit own-price elasticity is -0.09, -0.008 and -0.36 respectively. Meat and drinks own-price elasticity is -0.99 and -4.03. The own-price elasticities all goods are smaller than one except drinks, indicate that is necessity goods. The drinks are bigger than one, indicate that is luxury goods. Potato has the lowest cost restriction, but generally, it is still essential to the family's use. Expenditure elasticity for wheat is slightly lower than that of rice. The expenditure elasticity for fruit is lower than drink and vegetable is lower than the egg, potato, and rice.

In this case, it displays that when the household consumes adequate their daily meals, they always have the need for luxury goods. This table 3 we look at the cross-price elasticity with meat-maize and meat-drink has positives sign, while the positive cross-price elasticities denote two substitute goods, meat-maize and meat drinks are corresponding, meaning the rise price for a meat-maize complementary reduced in demand for quality meat-drinks. So if the price of meat products decreases, the demand for beverage products changes to the right, reflecting an increase in the demand for meat that leads to negative prices for price fluctuations. The exact opposite reason exists for replacement.

Table3: Own-price, Cross-price and Expenditure Elasticities

Own-price and cross-price elasticity										
		rice	maize	potato	egg	veg	meat	fruit	drinks	
i	Zeta	1	2	3	4	5	6	7	8	Expenditure Elasticity
rice	1	-0.4892	-0.0084	-0.0065	-0.0046	0.0299	-0.3302	0.0113	0.0401	0.758
maize	2	0.4373	-0.1610	-0.0603	-0.2584	-0.6376	1.2954	-0.2255	-0.3393	0.824
potato	3	-0.0032	-0.0006	-0.9916	-0.0043	0.0058	0.0117	-0.0014	-0.0022	0.731
egg	4	-0.0144	-0.0777	-0.1260	-0.0920	0.2211	0.1536	-0.2938	-0.0721	0.608
veg	5	0.1793	-0.1039	-0.0910	0.1089	-0.0084	-0.9761	-0.1441	-0.1197	0.916
meat	6	-0.3896	0.0193	0.0160	0.0199	-0.1069	-0.9375	0.0169	-0.3198	1.082
fruit	7	-0.0107	0.0676	0.0423	0.2891	0.2692	0.2339	-0.3641	0.4046	1.214
drinks	8	-0.2719	-0.0626	-0.0424	-0.0770	0.0480	2.3956	-0.2425	-4.0309	2.284

The result shows that consumer, whose region food is mainly rice, consume less maize and egg. As the rate of commodity purchase increase, the expenditure share of drinks will increase, but that of the other (rice, maize, egg, potato, vegetable, meat, and fruit) decrease.

When household income increase, expenditure share for all commodities also increase. If the family can produce agricultural production own self, they will reduce to consume commodity from the market.

When $i=j$, $\delta ij=1$, η_{ij} is the price elasticity. Since the value of the price elasticity is negative, it shows that the consumption and the price change in the opposite direction.

When $i\neq j$, $\delta ij=0$, η_{ij} is the cross-price elasticity. The value of cross-price elasticity can be positive and negative. When positive, it indicates that the substitution relationship between the two kinds of foods and when negative, it indicates the complementary relationship between the two kinds of foods.

5   Conclusion and Recommendation

Foods are necessary for body growth and development to stay healthy. This research studies foods expenditure the rural household in Takeo, Kampong Speu, Kandal provinces in Cambodia. This result indicate that the food price expenditure increase 1percent reflect commodities as well as, rice, maize,

potato, egg and vegetable will decrease 0.0909%, 0.0013%, 0.0019%, 0.0019%, respectively, and meat, fruit, drink will increase 0.0378%, 0.0057%, 0.0643%, respectively.

On the other hand, When food price expenditure increase one percent affect food expenditure elasticities commodities of rice, maize, potato, egg, vegetable, meat, fruit, and drinks will increase by 0.75%, 0.82%, 0.73%, 0.60%, 0.91%, 1.08%, 1.21%, and 2.28%, respectively. According to the analysis, the daily food people usually consume in a remote area has rice, maize, potato, egg, vegetable, meat, fruit, and drinks. The rice is mostly dairy consumption and also meat, vegetable. Furthermore, if the family can produce agricultural production own self, they will reduce to consume commodity from the market.

The results demonstrate many interest points for policymaker and government. The food expenditure analysis indicates that there is a strong relationship between income and household food demand. Especially, household income from agriculture, some region appears to significantly the high food consumption and some region is low food consumption such as rice, maize, potato, egg, vegetable, meat, and drink. The own-price of all commodities is less than one, which means a high response to food price changes. The size of the price flexibility itself is much lower than the flexibility of spending, indicating that revenue policies can be less effective in influencing the family's forms than the price policy

Analysis of the limitations of consumption of food suggests that income changes will affect the use of food. The estimated spending adaptability for food consumption varies from 0.608 for eggs to 2,284 for a drink. The results suggest that improvements in spending on food consumption will increase incomes increase.

Mostly, the consequences of the diet consumption examine to expose that revenue improvement, household size and type the agriculture household may lead to a considerable impact on household intake.

Acknowledgments

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