Socioeconomic Factors Influencing Food Security of Farmer's Household in Pak Phli District, Nakhon Nayok Province, Thailand

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Food security is a term used to describe whether or not households have access to sufficient quality and quantity of food. The agriculture sector in Thailand is the source of livelihood, the food security of rural households, as well as the main employer. This study was carried out to access the determinants of socioeconomic factors influencing food security of farmer's households in Pak Phli district, Nakhon Nayok province, Thailand. Questionnaires were used to collect data from 400 farmer's households. Descriptive statistics and stepwise regression analysis were used to analyze the data. The results revealed that respondents had a high level of household food security. The results of the regression model indicated that seven variables out of 14 had a significant influence on household food security. The factors influencing household food security were namely savings, farming experience, type of household, gender of household head, food expenditure, debts, and land ownership. All variables except farming experience and debts had positive relationships with food security of farmer's households.

Keywords: food security, farmer household, socioeconomic factors, household food security

Introduction

Food security and insecurity are terms used to describe whether or not households have access to sufficient quality and quantity of food (Aidoo *et al.*, 2013). This issue gained prominence between 1972 and 1974 during a global food crisis with the initial focus on national and global food availability. The focus later shifted to individual and household units of analyzes in the 1980s

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(Maxwell and Frankenberger, 1992; Aidoo *et al*., 2013; Onasanya and Obayelu, 2016). FAO (2010) defined food security as access by all time, have physical social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Food security is an indicator of food sufficiency for global, national, community, or household levels (Pinstrup-Andersen, 2009).

Food security is becoming the new form of instability that many countries in the world have encountered. Those countries are trying to create a large number of strategies to handle that challenge for the survival of their population. This is because food is one of the main factors in life that guarantee human security, especially in developing countries that this problem are becoming more severe. The demand for the food is increasing due to the increase of total population in these countries (von Braun, 2009). In addition, the climate change, energy crisis, the deteriorating of an environment, and a change from growing edible plants to energy plants caused the rise in food price. Therefore, the poverty in these countries become difficult for people to access to food. Food security has then turned into a national agenda for most of the countries. The rise in food prices not only causes the food instability, but also leads to the political, economic, and social instability. These problems have also been occurring in Thailand as reported by the UN. The UN reported that in 2015, the total population was approximately 7,300 million people and will increase to 8,500 million people in 2030, and to 11,200 million people in 2100 (World Population, 2016). This may cause unavoidable food insecurity for many countries including Thailand.

Thailand has a total area of 320 million rais (51.2 million ha.). However, Thailand has plentiful food supplies and is well-known for one of the dominant food-producing countries in the world. It was found that some Thai people are facing food insecurity. This does not only mean to have sufficient food for everyone, but the food must be safety to consume and full of nutrients. In 2012, FAO reported that starving people in Thailand were contributed to about 7.3% or around 3.6 million people. This was in accordance with the reported done by Isvilanonda and Bunyasiri (2009) founded that many people in both rural and urban areas faced with poverty. This means that there are insufficient food quantity and nutrients for people who live in the rural and urban area. In addition, farmers who are main food producers in Thailand are discovered to have food insecurity. This was supported by research conducted by the National Statistical Office indicated that approximately 87% of the household level faced with food insecurity, and about 54% were rice farmers (Charoenratana, 2011).

Pak Phli District, Nakhon Nayok province, the central region of Thailand, consists of seven districts. In 2015, agricultureal areas consisted of 125,518 rais

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(20,082.88 ha.) or about 39% of the total area of the province. In all, about 114,131 rais (18,260.96 ha.) were rice cultivating area or around 91% of the total agricultural area consisted of 7,819 farmer households (Nakhon Nayok Provincial Agricultural Extension Office, 2016). This area generally is regarded as the farming community in the central part of Thailand. The degradation of natural resources, the growth of urbanization through the community, the change in technology and perspective of community consumption behaviour have negative consequences for household food security in terms of food available, food access, food utilization, and food stability. Food security at a household level is important to design appropriate measurements in order to ensure food security for households (Tefera and Tefera, 2014). This study, therefore, focused on food security at household level by investigating the food security status of rice farming households in the area.

The main objective of the study was to determine socioeconomic factors influencing household food security in Pak Phli district, Nakhon Nayok province, Thailand.

Materials and Methods

The Study Area

The study was conducted in Pak Phli district, Nakhon Nayok province, the central region of Thailand. The Nakhon Nayok Provincial Agricultural Extension Office (2016) reported that rice cultivating is the dominant means of household livelihood in Pak Phli district accounting for 91% of the total agricultural area and consisting of 7,819 farmer households.

Pak Phli district locates at a latitude of 14°48'48"N and longitude of 109°16'7"E. It situates in the eastern part of Nakhon Nayok province about 25 kilometers away from Mueang district, covering a total area of 519.1 square kilometers, and divided into 7 sub-districts (Tambon) -- Ko Wai, Ko Pho, Pak Phli, Khok Kruat, Tha Ruea, Nong Saeng and Na Hin Lat -- which can be subdivided into 51 villages (Mooban). The neighboring districts consist of (from the west clockwise) Mueang Nakhon Nayok of Nakhon Nayok Province, Pak Chong of Nakhon Ratchasima Province, Prachantakham, Mueang Prachin Buri and Ban Sang of Prachinburi Province. The Sankamphaeng Range mountainous area is located in the northern section of this district (Wikipedia, 2016).

Population and Sampling Procedure

The population of this study was 7,819 rice growers in the Pak Phli district, Nakhon Nayok province who registered with Pak Phli Agricultural Extension Office in crop year 20015/0016. To determine appropriate sample size, Yamane (1973) formula was applied to calculate sample size of 400 rice growers with a 5% error and with a confidence coefficient of 95%. The respondents were selected through a simple random sampling technique and a proportional stratified sampling technique based on the size of the population in each sub-district in the area.

Data Collection and Analysis

Questionnaires were used to collect data from 400 respondents. The household head was interviewed as a key informant. Questionnaires were verified reliability with 30 rice growers in Koapo sub-district, Pak Phli district, Nakhon Nayok province who were not a sample in this study. The reliability of semantic differential scaling methods of food security was obtained by internal consistency using Cronbach's alpha with the values of 0.819 (Cronbach, 1951) which is acceptable.

The data analysis utilized both descriptive and inferential statistics. Frequencies, percentages, arithmetic means, and standard deviations were employed to describe the socio-demographic, farm characteristics, and food security. Food security concerned as dependent variable which contained the four index of food security; access, availability, utilization and safety, and stability (FAO, 1966), while socio-demographic and farm characteristics were independent variables. The stepwise multiple regression analysis (MRA) was applied to analyze the most important factors influencing food security of farming household.

Analytical Model

The regression model is expressed implicitly as follow:

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + ... \beta_{14} x_{14} + \varepsilon i$$

Where;
Y = Food security level
β_0 = Constant
β_k = Coefficients
εi = Error term
x_1 = Gender of household head (male = 1, female = 0)

x_2 = Marital status (married = 1, Otherwise =0)
x_3 = Education level of household head (Number of years of formal education)
x_4 = Type of household (extended household = 1, Otherwise =0)
x_5 = Household size (persons)
x_6 = Farming income (THB)
x_7 = Non – farm income (THB)
x_8 = Food expenditure (THB)
x_9 = Farm size (rais)
x_{10} = Ownership of land (Yes = 1, No = 0)
x_{11} = Experience in farming of years (Years)
x_{12} = Farm household labor (persons)
x_{13} = Debt of household (THB)
x_{14} = Saving of household (THB)

Results and Discussion

Socio-demographic backgrounds and farm characteristics of respondents

Table 1 shows socio-economic characteristics of respondents. As can be seen, more than half of respondents was a female (53.5%). A typical household head was middle age (53.15 years), indicating that interviewed farmers was economically active. The majority of respondents were married (94.0%), graduated from primary school (84.5%), and had single household types (67.8%). On average, household members involving in farming were 3 persons. Annual farm average income was 209,692 Thai Baht (THB). Non-farm average income was 40,256.41 THB/ year, implying that the average household income from farming was higher than non-farm income. Meanwhile, monthly food expenditure was 4,555.37 THB. The average farm size was 50.35 rais (8.056 ha.). Most of participant had their own land noticing from the percentage of Ownership of land at 95%. Averagely, participant farmers had experience in farming around 29.56 years. They had average household debt of household 51,687.50 THB, and their average savings of household were 17,328 THB, demonstrating that the participant farmers had debt more than savings fund.

Table 1 Socio-economic characteristics of respondents.

Characteristics	Frequency	Percentage
Gender of household head		
Male	186	46.50
Female	214	53.50
Age of household head		
(Mean=53.15, Max=73, Min=35, S.D =6.10)		
Marital status		
Single	24	6.00
Married	376	94.00
Education level of household head		
Primary school	338	84.71
Secondary school	18	4.51
Vocational certificate	30	7.52
High vocational	9	2.26
Under graduate	4	1.00
Type of household		
Single households	271	67.75
Extended household	124	31.00
Woman head of household	5	1.25
Household size (Mean = 4 persons)		
< 3 persons	158	39.50
3-5 persons	208	52.00
Farm household labor (Mean = 3 persons)		
< 3 persons	31	7.75
3 – 5 persons	298	74.50
> 5 persons	71	17.75
Farming income (Mean = 209,692.00 THB / year)		
≤ 20,0000 THB	225	56.25
20,0001 – 40,0000 THB	133	33.25
40,0001 – 60,0000 THB	36	9.00
> 600,000 THB	6	1.50
Non – farm income (Mean = 40,256.41 THB / year)		
≤ 40,000 THB	109	46.78
40,000 – 45,000 THB	34	14.59
45,001 – 50,000 THB	37	15.88
> 50,000 THB	53	22.75
Food expenditure (Mean = 4,555.37 THB)		
<5,000 THB	330	82.50
5,000 – 10,000 THB	58	14.50
>10,001 THB	12	3.00
Ownership of land		
Yes	383	95.75
No	17	4.25
Experience in farming of years (Mean = 29.56 years)		
<20 years	69	17.25
21 – 40 years	311	77.75
< 41 years	20	5.00

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| Characteristics	Frequency	Percentage
Debt of household (Mean = 51,687.50 THB)		
>50,000 THB	50	22.70
50,000 – 100,000 THB	116	53.00
> 100,000 THB	53	24.30
Saving of household (THB) (Mean = 17,328 THB)		
<10,000 THB	62	20.60
10,001 – 20,000 THB	119	39.70
>20,000 THB	119	39.70

Status of food security of farmer's households

Table 2 presents the status of food security of farmer's households. The overall food security elements at the household level of farmers was at a high level ($\overline{X}$ = 4.41). When consider from each aspect, it revealed that the food access, and food availability were at an exceptionally high level ($\overline{X}$ = 4.74 and 4.72, respectively), while food utilization and safety, and food stability were only at a high level ($\overline{X}$ = 4.07, 4.35, and 4.18, respectively) as shown in Figure 1.

The food security at household level in the study was high. This meant that the households might have less problems, or less anxiety about consistently accessing adequate food (USDA, 2016).

Table 2 Status of food security of farmer's households

Item	Level of food security					$\overline{X}$	SD.	Meaning
	very high (%)	High (%)	Moderate (%)	Poor (%)	very poor (%)			
Food access	78.09	18.32	2.73	0.86	0.00	4.74	0.23	Very high
Food availability	82.74	11.59	1.89	1.58	2.20	4.72	0.42	Very high
Food utilization and safety	71.75	22.91	3.63	0.79	0.92	4.07	0.24	High
Food stability	70.00	13.99	5.18	3.79	7.04	4.35	0.60	High
Grand mean	75.65	16.70	3.36	1.76	2.53	4.41	0.39	High
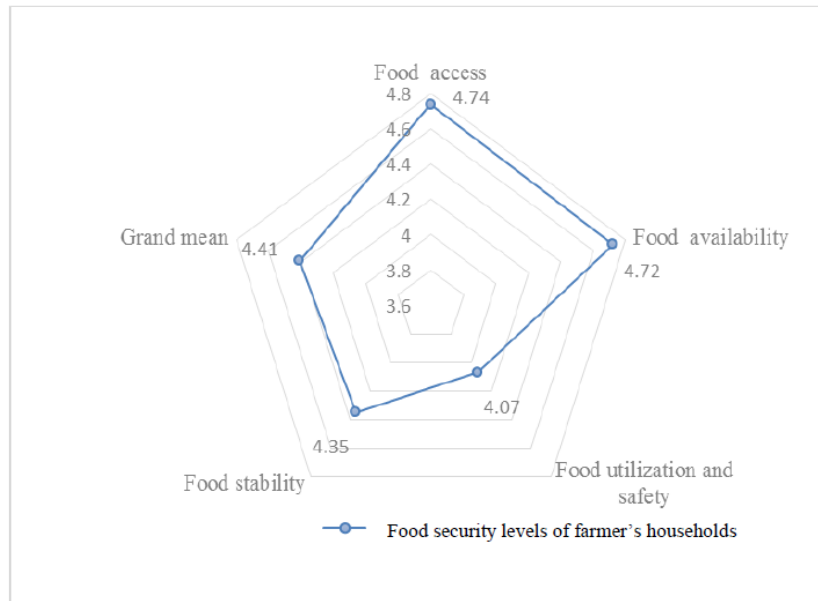
Figure 1 Status of food security of farmer's household**s.**

Factors influencing food security of the farmers' household

Table 3 illustrates the results of stepwise multiple regression analysis. The results revealed that out of 14 variables, seven variable factors significantly influenced food security of farmer's households. They were also capable of explaining the dependent variable by 17.6 percent (R^2=0.176). These variables were composed of savings, farming experience, type of household, gender of household head, food expenditure, debts and Ownership of land. All variables except farming experience and debt had positive relationships with household food security. These variables -- marital status, education, household size, farming income, non-farm income, farm size and farm household labor -- were not significant in explaining the food security of farmer's households in this study.

The results revealed that saving was positive and significant at the 1% level indicating that the increase in saving of households would lead to the increase in the food security status of households. This was because the increase in saving meant the increase in food accessibility. The finding was supported by the research results of Olson *et al.* (1996) and Babatunde *et al.* (2007).

The gender of household head was also positive and significant at 1%. This finding indicated that male household heads were involved in a food

security more than female counterpart. This could be implied that males engaged in farming more than females which was in the line with the findings of Onasanya and Obayelu (2016). Food expenditure was the total amount of money spends for food consumption. The result indicated that food expenditure had a positive relationship with food security at the 5% level presenting that the higher the amount of food expenditure, the higher the likelihood of food security. This result agreed with the findings of Babatunde *et al.* (2007) and Mannaf and Uddin (2012).

Ownership of land also has a positive relationship and was significant at the 5%. This result indicated that farmers who had own land proprietary rights gained more food security than those who did not have. This may be due to the fact that households that had own land possession rights were capable of accessing credit and also can increase capacity to produce more rice through the use of improving technologies (Aidoo *et al.,* 2013).

Type of household had a positive relationship and was significant at the 1% level. This meant household extension was more secure than the others. This may relate to a large farm size required more household labors because food production can be increased extensively through expansion of areas under cultivation, and large farm size households can produce more and diversity products (Aidoo *et al.,* 2013). Notwithstanding, members of the household engaged in off-farm activities. The results of the study revealed that income from the off-farm activities was also invested in agriculture to increase production and food availability at household level.

Experience in farming had a negative relationship and was significant at the 1% level. This result may relate to the age of the household heads. The productivity of the elderly household heads may decline for they were older resulting in their food security status (Mannaf and Uddin, 2012). This result agreed with Babatunde *et al.* (2007); Tekel, L. and Berhau, K. (2015) and Mannaf and Uddin (2012). This finding, however, contradicted to the finding of Onasanya and Obayelu (2016) that farming experiences were positively related to food security in Nigeria.

Table 3 The stepwise multiple regression analysis estimated factors influencing food security of the farmer's household.

Variables	B	SE	Beta	t	p-value
Constant	4.217	.062		67.635	.000**
Savings	3.737E-6	.000	0.186	3.686	.000**
Experience in farming of year	-.005	.001	-0.184	-3.779	.000**
Type of household	.069	.024	-0.146	2.931	.004**
Gender of household head	.006	.021	0.155	3.172	.002**
Food expenditure	5.711E-6	.000	0.121	2.517	.012*
Indebtedness	-3.393E-7	.000	-0.119	-2.487	.019*
Ownership of land	.120	.049	0.113	2.435	.015*

Multiple R = 0.176	F	=	5.931
Multiple R^2 = 0.162	Sig F	=	.000
SE_{est} = 0.199	DurbinWatson	=	1.136

*significant at level 0.05, **significant at level 0.01

Conclusion

Based on empirical evidences emanating from the analysis, it can be concluded that the status of food security of the farmer's household in Pak Phli district, Nakhon Nayok province, Thailand was at a high level. The households might have less problems or less anxiety about consistently accessing adequate food. Considering each dimension, it indicated that food access and food availability were at a very high level. Whereas food utilization and safety, and food stability were also at high levels. The stepwise multiple regression analysis results revealed that socioeconomic factors significantly affected the food security of farmer's households, namely savings fund, farming experience, type of household, gender of household head, food expenditure, debts, and ownership of land. All variables except experience in farming and debts had positive relationships with food security of the household. Thus, in order improve the food security, farmers' households should consider these above mentioned variables, the integral part of the agricultural development programs, and intensify efforts towards creating a favorable sustainable agriculture for small farmer's households.

Acknowledgements

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