# Factors influencing food and non-food expenditures of highland farm household in Chiang Mai province

## Tinnarat Pitakpongjaroen[1*] and Aree Wiboonpongse[2]

**ABSTRACT:** To be sustainable development in highland area is the major key points nationally in economics, social, and environment matters. As the previous, the insights study have mostly dedicated to the production, on the contrary, the consumption has been the main factor that to be pressure to consume most resources and producing. For this study, is to concern in the form of understanding of consuming and basic needs, and to analyze the expenditure consumption function model for both food and non-food matters of its household. In production year of 2010/11, the result of survey which has collected information sample of 185 households from highland area in Chiang Mai, revealed that the average of yearly expenditure in each household was 72,647.24 THB which was the most to pay of 40,487.51 THB for the food in each household. For the both expenditure consumption functions model is shown that, when there has got 1 more farm for growing its rice, the food expenditure could be more reduced of 1,017.80 THB per household. In the household, has employed the income from non-farm to be the expense for both food and non-food. Furthermore, farm's incomes in the both household and ethnic groups, those are the main factor to be controlled by both the expenditure consumption functions. However, the mode to enhance, for its food security and natural conservative in highland area, is to more support them to get more income from non agricultural sector, in the other hand, to support the food self-produced for its sufficient consumption also by reducing monoculture farming area.
**Keywords:** household food expenditure, consumption functions, highland, food security.

## Introduction

Sustainable development is the development responsive to needs of people in the current age and without a decrease in the capability of need responsiveness of people in the next generation. In addition, the components of a sustainable society are the abundance of resources, good quality of life, and stable economy of the society (Saengchai, 2002). Since a number of population increases continually, there is a balance between consumption and production with responds to needs of people. However, it has impacts on deterioration of resources and environment. Thus, country development leading to long-term sustainability needs to build a balance between economic growth and resource exploitation. In other words, it is the construction of a framework to approach a balance between demand side and supply side. This is under the condition of resource and environmental limitation in order to build a new balance economy (Wiboonpongse and Sriboonjit, 2013).

In the previous years, Thailand had a rapid economic expansion, resulting in social and economic changes. This causes changes in livelihoods of people both in rural and urban areas. Besides, inappropriate income distribution

[1]   Agricultural Systems Program, Faculty Agricultural Institution, Chiang Mai University, Chiang Mai, 50200
[2]   Department of Agricultural Economics and Extension Agricultural published, Faculty of Agriculture Institution, Chiang Mai University, Chiang Mai, 50200
*   Corresponding author: tinnaratp@hrdi.or.th

caused a big gap between people having a high income. That is, the coefficient value of the not-balance of incomes was equivalent to 0.485. Moreover, northern and northeastern Thailand had a ratio of poor people for 11.08 and 13.67 percent, respectively (Chansarn, 2009). According to the data during 2000-2011, households had an increase in monthly incomes and expenses continually, form 12,150 THB in 2000 to 23,236 THB in 2011 (income). Meanwhile, the purchasing power of commodities was also increased, from 9,848 THB in 2000 to 17,403 THB in 2001. Household incomes of northern Thailand was 15,727 THB per month which was lower than that of the country. That was households in northern Thailand had the expenses on commodity consumption for 12,814 THB per month whereas the poverty line of them was 2,160 THB/head/month. Thus, it was below the country poverty line which was 2,422 THB/head/month (The National Statistics Bureau, 2012). Based on a survey on highland area of Ngamsomsuk et al. (2010), it was found that households have an average annual income of 109,377 THB or 9,115 THB per month and average annual expenses on commodity consumption for 75,133 THB or 6,126 THB per month which is lower than that of the region. An important expense of household expenditure is food (25,309 THB per household) and follows by education. Besides, it was found that Yunneses and Lisu have more household expenditure than other ethnic groups. Based on review of previous research, it was found than factors having impacts on commodity expenditure include economy, e.g. income, debt (Deaton et al. 1989; Mohamed and Sherin, 2007; Sekhampu, 2012), personal factors and household, e.g. age and educational attain-ment of household head and household size (Tuyen et al., 2003). Besides, factors affecting commodity expenses of households in highlands are household size and net income per year (Wi-boonpongse and Sriboonjit, 1988; Ngamsomsuk, et al., 2010).

Highland development in the previous year's focused on income generation mainly earned from the agricultural sector. This caused highland farm-ers shifted from subsistent farming to commercial farming (mono cropping). Hence, they mainly needed to be relying on production factors out-side their community. Most of their agricultural yields were sold outside their community and part of the profits was used for the purchase of produc-tion factors and household commodities. How-ever, the highland farmers had inadequate pro-duction costs in the case of a low price of yields. Hence, they needed to get a loan for investment and household consumption, resulting in debts and poverty. Sighn (2003) found that incomes earned from the agricultural sector are not enough for household expenses of small-scale farmers and people in rural areas of India.

Due to changes the situations of the highland people as mentioned, it can be seen that they still have low income and must mainly be rely on the agricultural sector. However, their potential in agricultural production is limited due to the limita-tion of resources and decreased self-reliance on the production. Meanwhile, their consumption and commodity expenditure are like that of other households across the country (a tendency to be increased). This is because there is an increased in expenses due to necessity and a high price of commodities due to the policy of the government to raise the minimum wage. Therefore, there is a

tendency that the highland farmers will have no sustainable livelihoods. In fact, sustainable development needs food security as the priority. Thus, this study aims to place the importance on the understanding about consumption styles basic needs and an analysis of a model of household food expenditure and model of household expenditure aside from food. This can be a guideline for elevating household quality of life together with the conservation of highland natural resources leading to sustainable highland development.

## Review of literature

Previous studies on commodity expenditure of households included the investigation on models and estimation of household consumption function. Theories used for the investigation were the theory of consumption in accordance with a model of John Maynard Keynes (Absolute Income Hypothesis). According to this theory, it is a short-term consumption and an income is the indicator of consumption behaviors of private is of its main concept (Keynes, 1936). Its hypothesis is that consumption in depending on a level of incomes. An increased income will cause increased consumption but still less than a level of increased incomes. That is, the value of marginal propensity to consume: MPC is more than zero but less than one. Besides, the average propensity to consume: APC will decrease when an income is increased. However, this theory has some limitations in which it does not realize on their factors, e.g. interest rate and exchange rate (Thawornthon and Theerawanpithak, 2007). In addition, results of previous studies are in the same direction with

the said theory. Some studies found that incomes outside farming have an effect on expenditure (Sighn, 2003; Tuyen et al. 2012). Nongkhu (2013) found that a high income sample group has a lower than that of a low income sample group. data used for an analysis of data on household commodity expenditure included time series data and cross-section data obtained for a survey on social and economic conditions.

Previous research on a model of household consumption had an analysis of the sorting of commodity expenses: commodity expenditure and non-commodity expenditure (National Statistic Bureau, 2010). Low income households has a higher ratio of consumption expenditure and income than that of high income household. Besides, they place the importance on food, beverage, and tobacco expenditure. Unlike low income households, high income households place the importance on travelling and communication (Siripanyawat, 2010). In addition, it can be sorted into food expenditure and non-food expenditure. It is mostly used for an analysis about household poverty. For previous studies about factors affecting short-term household consumption, the following were related factors: household size (Wiboonpongse and Sriboonjit, 1988; Tuyen et al., 2003; Mohamed and Sherin, 2007) and size of highland household had an affect on consumption expenditure, particularly among Hmong, Lahu, and Arkha ethnic groups (Ngamsomsuk et al., 2010). For personnel attributes and household based on the demand theory, it made us know that demographic factors e.g. age, sex, and educational attainment have an effect on a model of household expenditure (Steward et al., 2004 as cited in Wikraipat et al., 2012). Hence, related

factors include age and educational attainment of household head and land owner have the same direction of a relationship with consumption expenditure (Sekhapu, 2012). In addition, size of farm land has the same direction of a relationship with consumption expenditure since farmers have increased agricultural activities (Sakulcharoen, 2003). In contrast to a study of Tuyen et al. (2003), they found that the reduction of farm land had no affect on household expenditure but off-farm employment had an affect on incomes and food expenditure.

Tools used for an analysis of a model of commodity expenditure at a household level mostly employ regression method focusing on linear model (Tuyen et al., 2003; Sekhampu, 2012) and quantile regressions. It aims to estimate by separating quantiles of dependent variables (Koenker and Basset, 1978) to reduce the inconsistency of the variance value of inaccuration or homoscedasticity (Daeton et al. 1989; Ebru and Melek, 2012). Besides, a Tobit model is also employed (Oral and John, 1983; Wikraipat et al., 2012).

## Methodology

### A model used for this study

Data used in this study were data on short-term household economic conditions (cultivation year 2010-2011), which the area changed from the subsistence to the mono cropping systems. This model analysis aimed to seek for factors explaining household expenditure. Two models were used: Food expenditure: $C_{food}$ and Non-food expenditure: $C_{non-food}$ and analyzed by using multiple regression with Eview 7.1 program. The mathematical equation was shown below:

$$C_{food}, C_{non-food} = a + b_1 \, age + b_2 \, educ + b_3 \, size + b_4 \, land + b5 \, riceland + b6 \, ethnic + b7 \, farmic + b8 \, non\text{-}farmic + error \; term$$

Where: Independent variables were: 1) Age of household head (age: year) and 2) Educational attainment of household head (edu: dummy-0 = no schooling, 1 = elementary (Pratom 6) – upper secondary school (Mattayom 6) graduates). Old household head or those having high education had a high tendency to have an effect on increased household expenditure. 3) Household size (size: person) was an important factor on consumption size with was the same direction of household expenditure. In a highland, Household size was an important factor since it would have an effect on the expansion of household farm land for increased incomes. 4) Agricultural land (land: rai ) was an important factor for production in a highland. 5) Rice growing area (rice land: rai) – growing rice made farmers feel confidence in food security at a household level and there was a high proportion of rice purchasing. 6) Ethic group (ethnic: dummy –0=Palong and Karen ,1 = Arkha, Lahu, and Lisu ethnic group 5 with different consumption style). 7) Incomes earned from the agricultural sector (farmic: THB/ household/ year). 8) Incomes earned from the non-agricultural sector (non-farmic: THB/household/year). In this study, all of these were selected for analyzing in the consumption equation. Since the non-agricultural sector was a source of supplementary household incomes, it might stimulate households to have increased consumption.

In this study, data were obtained form 185 agricultural households (48.68 percent of the total population).This study covered an area of Pang Daeng Nai Royal Project Extensions, Moo 9, Baan

Thunglook, Chiangdao sub-district, Chiangdao district, Chiang Mai province (36,769.29 rai).The areas under the operational responsibility included 5 villages: Baan Pangdaengnai, Baan Huaypong, Baan Maechorn, Baan Thakhilek, and Baan Phalai (346 households, 1,880 persons). These communities are located in upland areas and dependent on rain fed condition. People in this community used to practice rotation cropping and there areas have more than one ethnic group.

## Result and disputations

### Social and economic conditions of farmer households

It was found that the household heads were 42.5 years old on average. One-half of them (50.27%) did not attend school. Only 5.95 percent of them were upper secondary school graduates. About one-third of tem (35.14%) were Daraang or Palong and followed by Karen (22.70%) Arkha (14.59%), Lisu (14.05%), and Lahu (13.51%), respectively. They had 5.25 family members on average. They had 18.75 rai of land and 17.46 rai was a farm land. Most of them (90.81%) grew crop plants permanently and most of the cultivated land was in Sri Lanna national park. Main occupation of the farmers was field crop growing (99.5%) and they grew rice for only 2.18 rai per household. The farmers grew maize as a main source of feed for livestocks. Besides, they grew various kinds of bean and fruit tree e.g. mango, longan, passion fruit, etc. One-half of the farmers (49.18%) grew rice for household consumption and most of it was highland rice (298 kg. of rice yields per rai). Their community had two production systems: agricultural production system (80%) and non-agricultural production system (handicraft, tourism, and hired worker). For the agricultural production system, the farmers grew rice-farm crops – fruit tree – and vegetables as main plants (22.70%) and it returns was 13,006 THB per rai. This was followed by farm crops – fruit trees (returns = 14,154 THB per rai) and farm crops –fruit trees – vegetables (returns = 12,179 THB per rai).

It was found that household incomes (cash) of the farmers were 117,720 THB per year or 9,810 THB per month which was lower than that of an average of northern Thailand. In other words, their income was 1,868 THB per head per month which was below the poverty line in the year 2010 of northern Thailand (2,055 THB per head per month) and Chiang Mai province (2,197 THB per head per month). Their household had incomes earned from the agricultural sector for 93,771 THB per year and from the non-agricultural sector for 23,949 THB per year on average. The farmers had expenditure on commodities for 72,642 THB per household per year which was lower than that of an average of northern Thailand, it conformed to a study of (Ngamsomsuk et al., 2010). Details of the expenditure were: food (40,488 THB, 55.73%) – food purchasing (29,333 THB) and rice for household consumption (11,154 THB); non-food (32,160 THB, 44.26%) – fuel (10,868 THB), miscellanies (7,289 THB), and children schooling (6,158 THB), respectively. (**Table** 1). Consumption style of these households was consistent with a low income group which mostly had the expenditure on food as the priority (Sricipanyawat, 2010).

**Table 1** Socio-economic characteristics of highland households

| Variable | Minimum | Maximum | Mean | Std.deviation |
|---|---|---|---|---|
| Cash income (THB[1]/year) | 18,300 | 354,450 | 117,720.39 | 70,702.67 |
| Farm income  (THB/year) | 16,300 | 263,750 | 93,770.66 | 49,478.58 |
| Non –farm income  (THB/year) | 0 | 182,500 | 23,949.73 | 32,699.89 |
| family members (person) | 2 | 11 | 5.25 | 1.81 |
| Land (rai) | 1 | 51 | 17.46 | 9.09 |
| Riceland (rai) | 0 | 14 | 2.18 | 2.81 |
| Age of household head (in years) | 21 | 80 | 42.50 | 12.65 |
| Household consumption expenditure (THB/year) | 10,300 | 224,500 | 72,647.24 | 43,765.67 |
| Food expenditure (THB/year) | 9,500 | 118,600 | 40,487.51 | 23,148.55 |
| ● Rice   (THB/year) | 2,900 | 45,600 | 11,154.48 | 8,877.64 |
| ● Food   (THB/year) | 6,600 | 109,500 | 29,333.03 | 20,678.02 |
| Non food expenditure (THB/year) | 2,600 | 152,160 | 32,159.73 | 27,132.41 |
| ●Health (THB/year) | 0 | 17,080 | 1,187.24 | 2,259.11 |
| ●Clothing (THB/year) | 0 | 14,000 | 2,678. 49 | 2,483.44 |
| ●Children schooling  (THB/year) | 0 | 73,000 | 6,157.73 | 9,876.21 |
| ●Fuel  (THB/year) | 1,600 | 108,000 | 10,868.76 | 18,358.45 |
| ●Communication (THB/year) | 0 | 15,000 | 1,932.97 | 2,614.60 |
| ● Water/ electricity charge (THB/year) | 0 | 8,800 | 1,202.16 | 1,710.26 |
| ●Miscellaneous expenses (THB/year) | 1,000 | 120,000 | 7,289.03 | 15,827.45 |

Note: [1] in 2010/11 the exchange rate 1USD = 31.65THB

**A consumption functions of farmer households**

Since some variables had a co-efficient value at about 0.40, there was a tendency to have a multicollinearity problem.  Thus, and analysis of the model needed to have an alternative model by selecting variables. Based on equality testing of variance values, it was found that there was a heteroskedasticity.  Hence, values of 4 forms of the model were estimated by using General least square method. The people on the highland demand sustainable development in the food security which in this study to find alternative of consumption and basic needs. Those are evaluate under the different factors of food and non-food (**Table 2**).

**Table 2** Multiple regression analysis of factors that determine the food expenditure and non-food expenditure of households.

| Variable | food expenditure ($C_{food}$) | | non-food expenditure ($C_{non-food}$) | |
| --- | --- | --- | --- | --- |
| | Model 1 | Model 2 | Model 3 | Model 4 |
| | coefficient | coefficient | coefficient | coefficient |
| Constant | 10,188.260 | 13,104.290* | -6,942.775 | -9,397.630 |
| | (8,541.328) | (7,796.464) | (9,515.358) | (9,698.496) |
| Farm income (THB/year) | 0.096** | 0.100*** | 0.179** | 0.153*** |
| | (0.050) | (0.051) | (0.099) | (0.058) |
| Non–farm income (THB/year) | 0.152*** | 0.150*** | 0.218*** | 0.208*** |
| | ( 0.058) | (0.058) | (0.047) | (0.099) |
| Size (person) | 3,731.348*** | 3,666.155*** | 898.683 | 905.625 |
| | (1,994.286) | (1,199.004) | (1,061.462) | (1,084.648) |
| Land (rai) | - | 3.355 | - | 523.463*** |
| | | (178.440) | | (257.411) |
| Riceland (rai) | -1,013.647*** | -1,021.949*** | 194.782 | 143.742 |
| | (493.675) | (502.965) | (585.929) | (578.219) |
| Age of household head (in years) | -82.362 | -123.802 | 36.340 | -13.482 |
| | (144.557) | (126.448) | (130.125) | (129.327) |
| Education of household head | 2,074.485 | - | 5,464.866 | 6,728.489* |
| [Dummy 0 = illiterate 1=Graduated | (3,799.347) | | (4,064.001) | (4,078.276) |
| from elementary school - High | | | | |
| School] | | | | |
| Ethnic [Dummy 0 = Other ethnic | 6,734.475*** | 6,243.197** | 12,098.100*** | 12,601.350*** |
| (Palaung, Karen) | ( 3,369.336) | (2,891.564) | (3,866.741) | (3,755.989) |
| 1 = Ethnic Akha, Lahu and Lisu] | | | | |
| $R^2$ ( Adj $R^2$ ) | 0.335 (0.309) | 0.334 (0.308) | 0.406 (0.382) | 0.426 (0.400) |
| F | 12.822 | 12.745 | 17.303 | 16.757 |

Note : * significant at the 1% level , ** significant at the 5% level , *** significant at the 10% level / Numbers in parentheses = standard errors

After comparing model 1 with model 2 based on food expenditure ($C_{food}$), it was found that the coefficient value of constant between the two models was almost the same. That was, model 2 had the coefficient value of constant (statistically significant level) at 13,104.29 THB which was more than the estimated value of food expenditure (minimum level) of 10% of the poorest households per year (9,500 THB). This implied that the model could explain about household food expenditure.

Besides, the responsiveness of food consumption per incomes earned from agricultural and non-agricultural sectors were different. That was, the marginal propensity to consume (mpc) was equivalent to 0.096, 0.100 and 0.152, 0.150, respectively. It was found that rice growing areas had an opposite direction of a relationship with food expenditure. This implied that 1 rai of rice growing area could reduce food expenditure for about 1,017.80 THB per household. The people on highland are consumed traditional and conservation local rice varieties, similar to Sighn (2003), Tuyen et al. (2003), and Ting et al. (2012)

Regarding the variable on ethnic group, it was found that Arkha, Lahu, and Lisu had more food expenditure than that of Palong and Karen for about 6,200-6,700 THB per year in both models. This conformed to a study of Ngamsomsuk et al. (2010) since Arkha, Lahu, and Lisu preferred to grow cash crops (e.g. maize) rather than other food plants and hence they had more food expenditure than that of Palong and Karen who preferred to grow highland rice and vegetables. In addition, incomes earned from the agricultural sector and household size were factors determining expenditure of the two models.

For the comparison of model 3 with model 4, it was found that the coefficient value of constant of the two models was almost the same but had no statistically significant difference , it shown that no other non-food basic needs significantly. It was found that non-food expenditure ($C_{non-food}$) had a relationship with incomes and ethnic groups. Meanwhile, model 4 had a relationship with agricultural areas. This implied that an increase in agricultural areas would make households have superfluous expenditure and it con-

formed to a study of Sakulcharoen (2003). Besides, model 4 ($C_{non-food}$) had a relationship with educational attainment of household heads. This implied that households having an educated head usually had non-food expenditure rather than those having non-educated head about 6,728.49 THB. Most of their expenditure was on children schooling. For these models 3 and 4 ($C_{food}$ and $C_{non-food}$), households relied on incomes earned from the non-agricultural sector for expenditure rather than incomes earned form the agricultural sector. This implied than households would mainly relied on incomes earned from the non-agricultural sector if they too much consume commodities. Regarding the variance on ethnic groups, it was found that Arkha, Lahu, and Lisu had more non-food expenditure than that of Palong and Karen ethnic groups like models 1 and 2 but the proportion of their expenditure was higher for twice as much. This implied that the scheme of extravagant commodity consumption of Arkha, Lahu, and Lisu still had a higher proportion than that of Palong and Karen ethnic groups whose livelihoods were closely connected with the forest.

## Conclusion and recommendations

As a result from the same cultivation year 2010/11, the income and commodities expenditures of highland households has proportion less than the regional and the national levels. The highland household consumption style is similar to that of northern Thailand which places the importance on food expenditure as a priority. However, there is the difference in other expenditures. Highland households have fuel expenditure for

travelling to other urban communities and the travelling is rather difficult since their communities are located in remote areas. Besides, they have expenditure on children schooling in which the children have to go to school in urban areas where they stay in dormitories. Households of Arkha, Lahu, and Lisu have more food and non-food expenditures than that of Palong and Karen ethnic groups. According to results of the study, highland households should apply the philosophy of sufficiency economy to their livelihoods for self-reliance. They should be encouraged and supported to form a group of community cooperative shop and savings. In addition, community market should be promoted in order to stimulate community economy and reduce the reliance on external commodities among Arkha, Lahu, and Lisu ethnic groups.

It can be seen that incomes earned form the non-agricultural sector is a main factor on consumption of basic commodities and consumption beyond basic necessities. Therefore, the determination of highland sustainable development should place the importance on non-agricultural occupations; particularly based on local wisdom utilization e.g. cottage handicraft. This helps support increased incomes and elevate quality of life together with the conservation of highland natural resources. Rice growing areas having an opposite direction of a relationship with food expenditure is an important factor about household basic needs and food security. Thus, food security should be encouraged and promoted for the reduction of highland household food expenditure. This can be practiced by an increased in the efficiency of rice production per area. Promotion of food source production in the community and community food bank should be encouraged. Including supporting crops with economic returns based on appropriateness with each area with a system of rice production base of household items such as fruit trees to reducing monoculture farming area that impact the environment on the highland. It will be reduce resource use and preserve into next generation.

For further research with a big sample size which increasing of population and resources uses, quantile regressions should be employed. This is because there is much difference in expenditures which may have an effect on the difference in mpc of households. It will have implication towards the determination of a guideline for the promotion of sustainability on the highland.

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