

CHAPTER III BACKGROUND, PRODUCTION AND CONSUMPTION

III.1 Physical and Socio-economic Background

III.1.1 Location

Huai Tadd is located at Inthakin Subdistrict of Mae Taeng District, in Chiang Mai Province (Figure 2). It is between 900-940 meters above sea level and 71 km to the northwest of Chiang Mai City. There is an all-weathered road of eight km. maintained by the Cha Siam Tea Estate (CSTE) from 63th km. on Chiang Mai-Fang Highway and the road climbs steeply, passing tea plantations and climax forest.

III.1.2 Physical environment characteristics

Huai Tadd village lies among surrounding peaks which rise to height of 1,100 meters and are mainly of granite rock. On the slopes there are isolated limestone formation overlying parts of granite rock. The landscape has been sculpted with steep-sided ridges, interspersed with narrow valleys containing permanent streams. The drainage flows into Mae Ping Watershed System.

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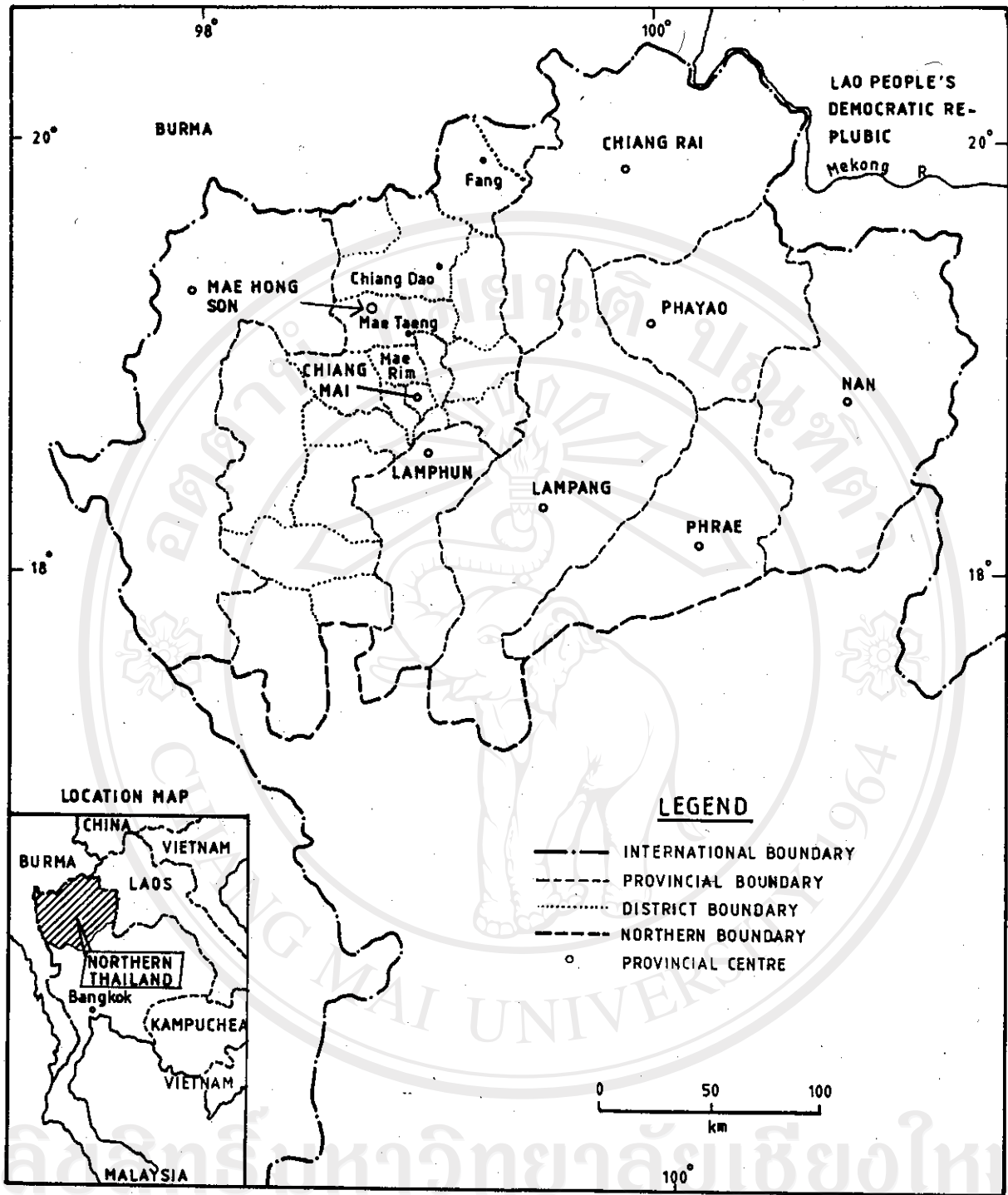


Figure 2. Map of study area (TA-HASDP, 1988)

The average monthly rainfall varies between 3.5 mm - 240.8 mm with average annual rainfall of 1,183.6 mm. The rainfall peaks are in August and September and the driest periods are in January and February (Table 3).

Table 3. Meteorology data of Huai Tadd village for 1956-1985.

Month	Rainfall		Temperature				Evapo ration 24 hrs (mm)	Relative humidity (percent)
	average (mm)	ave	Max	Min	highest	lowest		
January	9.7	20.3	28.9	13.5	34.7	3.7	27.1	72.2
February	3.5	22.7	32.1	14.5	37.3	7.3	30.3	62.8
March	13.3	26.2	35.1	18.0	39.6	10.0	69.8	55.7
April	47.1	28.7	36.3	21.8	41.5	15.5	78.0	58.6
May	154.5	28.1	34.2	23.6	41.4	19.6	113.3	71.4
June	134.2	27.3	32.3	23.7	37.9	20.0	68.7	78.0
July	171.8	26.9	31.7	23.5	37.5	20.5	105.6	79.3
August	232.9	26.4	30.9	23.4	35.4	20.7	166.5	81.8
September	240.8	26.3	31.2	22.9	36.1	16.8	131.6	81.8
October	114.2	25.6	31.0	21.7	35.3	13.3	74.9	79.9
November	41.5	23.6	29.8	18.8	34.5	6.0	59.5	77.5
December	20.1	21.0	28.5	15.0	33.5	5.0	92.9	75.3
Total	1,183.6	-	-	-	-	-	1,018.2	874.3

Source : Cha Siam Tea Estate (1986)

Temperature is generally mild and warm with the highest at 41.5 °C in April and the lowest at 3.7 °C in January.

Potential evaporation is 1,018.2 mm with maximum of 166.5 mm in August and minimum of 27.1 mm in January.

The relative average humidity is 72.9 percent with the maximum of 81.8 percent in August and September and minimum of 55.7 percent in March.

III.1.3 The Historical background

This village was occupied by Lahu Na tribe (Black Lahu) who migrated from Kengtung, Burma in 1954. They migrated in order to escape from the fighting between Burmese and Chinese soldiers - Chiang Kai-Shek's Kuomintang Troops (KMT) in their village in the early late 1950's. Jones (1967) stated that the relationships between villagers at Huai Tadd and KMT was difficult to determine, they left because they were very tired of being used by the KMT, but on the other hand, some of the men actually fought with KMT.

Since they were in poverty at that time and neighboring tea estate needed labor, the manager-director of this estate allocated 2.5 hectares of company-leased land on which to build their village and worked as wage labor in this estate rather than engaging in shifting cultivation (Walker, 1981). By 1960, the manager developed a fully integrated plantation which would be rely on it own resources for its raw leaves inventory, and then extensive land change and terracing was begun on sloping toward this village which continued well in 1964 (Van Roy, 1971).

The Public Welfare Department (PWD) established the hilltribe settlement in 1960 and TA-HASDP (1981) started to support economic development of these hilltribes through coffee and tea plantation projects (supervising and providing credit in kinds).

The villagers have planted more than 30,000 coffee trees around the village, mostly on the land of the original RTP lease. In 1982 RTP management requested that the land being used by the Huai Tadd villagers be removed from RTP lease (Hoare, 1986).

III.1.4 Socio-economic status of the village

Health and sanitation including family planning are the main programs for improving quality of life of the villagers. Three water sources have been installed in order to provide clean water for daily consumption and watering plants.

The population growth of this village is low compared to the average annual increase in population in the highlands of northern Thailand. In October 1969, Huai Tadd's population was 200 people in 28 households (Keen, 1972) compared to 289 people in 66 households in 1990. The growth rate was 1.77 percent per year during that period.

III.2 Production

III.2.1 Classification of farmers, land use and cropping systems in the study area

Farm sizes range from 2 to 22 rai and the average size is 8.76 rai/family. The farmers in this study can be divided into 18 groups based on the size of landholding :

Table 4. Farm grouping

Group No. *)	Land size (rai)	Frequency
2	2.00	4
3	3.00	4
4	4.00	5
5	5.00	4
6	6.00	6
7	7.00	8
8	8.00	8
9	9.00	4
10	10.00	3
11	11.00	4
13	13.00	1
14	14.00	7
16	16.00	2
17	17.00	1
18	18.00	1
19	19.00	2
20	20.00	1
22	22.00	1

*) The assigned identification number of each group based on land size

The major cash crops are tea, coffee, lychee, and corn. Rice is staple food (Table 5). Crops are grown on sloping areas (0-45 percent) around the village (Suton et al., 1989). Two methods of soil conservation adopted from TA-HASDP are practised by most of the farmers i.e. terraces for coffee and tea plantation and grass strips for rice and corn.

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Table 5. Total area of crops grown at Huai Tadd village, 1990

Crop	Total area (rai)	No. of farms
Coffee	218	52
Tea	185	50
Lychee	30	20
Rice	105	23
Corn	22	6

Source : Thai-Australia Highland Agricultural and Social Development Project (TA-HASDP).

Rice and corn are suggested to be cultivated at slopes between 6 and 35 percent. Perennial or tree crops (coffee, tea and lychee) are grown at slopes between 36 and 55 percent (TA-HASDP, 1991). In practice, perennial crops can be grown in rice or corn field, but rice is difficult to be cultivated in the perennial crop field. Evaluation trial results have shown that grass strips can reduce the annual soil loss from 7 tons without conservation to 0.3 ton per rai per year and terraces for perennial crops is expected to reduce until the acceptable limit for watershed conservation; 0.8 ton per rai per year (TA-HASDP, 1991).

Land preparation including pre-weeding for rice and corn is done within March to April and continue until planting, until the first week of May. Fertilizer is applied at planting time. Two to three weeks after germination, the field has to be weeded. Farmers usually do first and second

weeding at the first week and at the end of June, respectively. Sometimes, extra weeding may be necessary if the weeds are worst (usually in July). The harvesting periods both for rice and corn take place from August to September, but for traditional rice variety, it is harvested from November to December.

Terraces for coffee, tea and lychee plantations are constructed within March to April, and digging holes and planting are done on June. First and second slash or ring weeding are done in July and September, and clean weeding in October. During dry season, watering or irrigating is needed for these crops (February to March). In general, they apply animal manure to replace chemical fertilizer until crop are in full production. At this time, half fertilizer is applied in addition to animal manure. Only some farmers use chemicals to control pests and diseases, especially for lychee and coffee.

The plucking cycle of tea is about one week, coffee bean picking is within November to January, and harvesting lychee is within April to May.

The eleven types of permanent farming systems found in this village are the following :

Rice-based

1. Rice and tea (7 farms)
2. Rice and coffee (6 farms)
3. Rice, coffee and corn (3 farms)
4. Rice, coffee, tea, and corn (3 farms)
5. Rice, coffee and tea (2 farms)

6. Rice, coffee, and lychee (2 farms)

Non-rice-based

7. Coffee, tea and lychee (16 farms).

8. Coffee and Tea (15 farms)

9. Coffee (5 farms)

10. Tea (5 farms)

11. Tea and lychee (2 farms)

Like other highland villagers, the farmers in this village raised livestock for consumption and festivals. There was only one farm found raising pigs for sale.

III.2.2 Income and labor profile

The farmers sell coffee beans to traders or middlemen who visit this village and fresh tea leaves to the CSTE and RTP. These two companies buy approximately fresh leaves from farmers about 30.00 and 7.00 percent of the total raw material for their factories. They also provide labor opportunities for the villagers with wage rate at 60 baht/day.

The average family income was 1,8227 baht/family/year, ranging from 13,974 baht to 32,004 baht. There are only two sources of income i.e. farm (12,850 baht or 70.50 percent) and wage income (5,377 baht or 29.50 percent). The Groups who have land larger than 17 rai did

not have income from wage labor. Groups 2, 3 and 4 gained more than 50 percent of their income from wage activity.

Table 6. The composition of family income for each group

Group No	Income (baht/family/year)		
	Farm	Wage labor	Total
2	1554 (11.12)	12420 (88.88)	13974
3	1699 (8.87)	17460 (91.23)	19159
4	6287 (36.03)	11160 (63.97)	17447
5	8297 (54.38)	6960 (45.62)	15257
6	11029 (63.87)	6240 (36.13)	17269
7	7808 (57.04)	5880 (42.96)	13688
8	9843 (66.14)	5040 (33.86)	14883
9	10859 (74.48)	3720 (25.52)	14579
10	12624 (74.50)	4320 (25.50)	16944
11	11781 (78.43)	3240 (21.43)	15021
13	10441 (74.36)	3600 (25.64)	14041
14	13032 (69.79)	5640 (30.21)	18672
16	21250 (73.91)	7500 (26.09)	28750
17	12136 (77.22)	3600 (22.78)	15736
18	32004 (100.00)	0 (0.00)	32004
19	19028 (100.00)	0 (0.00)	19028
20	23787 (100.00)	0 (0.00)	23787
22	17840 (100.00)	0 (0.00)	17840
Ave.	12850 (70.50)	5377 (29.50)	18227

Values in parentheses are percentage of the total income

Table 7 shows that each group of farmers utilized their family labor below the availability of their family labor. The average surplus labor was 374 mandays or 52.93 percent from the total family labor. Because of very small

size of farms, farmers in groups 2, 3 and 4 utilized their labor as employer in these two companies more than they work in their own farm.

Table 7. Labor profile and utilization for each group

Group No	Labor utilization (mandays)			Family size (person)	Family labor --(mandays)--	Labor surplus
	Farm	Wage	Total			
2	80 (13.91)	207 (36.00)	287 (49.91)	4.00	575	288 (50.09)
3	74 (8.22)	291 (32.33)	365 (40.55)	5.00	900	535 (49.45)
4	118 (16.86)	186 (26.57)	304 (43.43)	4.80	700	396 (56.57)
5	126 (28.00)	116 (25.78)	242 (53.78)	4.25	450	208 (47.22)
6	129 (19.11)	104 (15.41)	233 (34.52)	4.50	675	442 (65.48)
7	146 (26.55)	98 (17.81)	244 (44.36)	4.25	550	306 (55.64)
8	169 (37.55)	84 (18.67)	253 (56.22)	3.88	450	197 (43.78)
9	154 (34.23)	62 (13.77)	216 (48.00)	4.00	450	234 (52.00)
10	134 (29.78)	72 (16.00)	206 (45.78)	3.00	450	244 (54.22)
11	196 (43.56)	54 (12.00)	250 (55.56)	4.00	450	200 (44.44)
13	170 (29.57)	60 (10.43)	230 (40.00)	5.00	575	345 (60.00)
14	207 (29.57)	94 (13.43)	301 (43.00)	3.71	700	399 (67.00)
16	330 (34.74)	125 (13.16)	455 (47.90)	5.00	950	495 (52.10)
17	175 (29.17)	60 (10.00)	235 (39.17)	3.00	600	365 (60.83)
18	322 (30.67)	0 (0.00)	322 (30.67)	6.00	1050	728 (69.33)
19	364 (52.00)	0 (0.00)	364 (52.00)	5.00	700	336 (48.00)
20	313 (34.78)	0 (0.00)	313 (34.78)	5.00	900	587 (65.22)
22	267 (38.14)	0 (0.00)	267 (38.14)	4.00	700	433 (61.86)
Ave.	193 (29.00)	90 (13.70)	283 (43.07)	4.36	657	374 (52.93)

Values in parentheses are percentage of the total labor utilization

Since, CSTE and RTP limit their demand for labor i.e. 137 and 25 workers a year, the farmers in the study area have to compete with labor from other villages. Most

of the labor supply come from Chiang Dao District (60 percent), only 40 percent come from the villages nearby the companies. However, the farmers in this village have more chance to work in these two companies than farmers in other villages since they stay closer these companies. They do not need travel by car or motor cycle.

III.2.3 Farm production and return

The results of calculation of gross income per rai as well as labor use per rai for each crop from the actual situation are presented as follows.

Table 8 shows yield, labor use, input cost and gross income per rai of milled rice and corn. Milled rice will be referred to as rice from now onwards. Both rice and corn yields were relatively low comparing to the average yield in Chiang Mai Province for crop year 1989/1990, but the farm price of rice was higher than the average farm price in the whole country. The average yield of rice and corn were 512 and 405 kg/rai, and the average farm prices were 3.61 and 2.93 baht/kg as reported by Centre for Agricultural Statistics Office of Agricultural Economics (1990).

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Table 8. Yield, labor use, input cost, and gross income per rai of rice and corn

Crop	Labor use		Yield (kg)	Price (baht/kg)	Value (baht)	Input cost (baht)	Gross income (baht)
	Peak season ----(mandays) ----	Other					
Rice*	12.50	5.30	167.50	5.00	837.50	351.40	486.10
Corn	10.42	5.02	290.00	2.50	725.00	338.25	386.75

Peak season is April-May

Gross income = Value - Input cost

* Milled rice

During data collection, production and labor utilization could not be obtained completely for some ages of coffee and tea. This requires interpolation from available data in relation with time. Prediction data from a nearby village (Hmong village, in Mae Taeng District) was used for lychee since lychee was still of an immature stage in the study area (planting year 1988 and 1989). The equation of production, labor use and input cost per rai are presented as following :

1. Coffee

$$YCo = -22.43 + 24.33 T - 2.19 T^2 + 0.05 T^3 \dots\dots\dots (3)$$

$$N = 14 \quad df = 10 \quad F = 12.66 \quad R^2 = 0.7916$$

$$LCo = e^{3.64 T - 0.32} \dots\dots\dots (4)$$

$$N = 14 \quad df = 12 \quad F = 134.80 \quad R^2 = 0.9183$$

$$CSCo = 2759.70 - 1187.80 T + 168.45 T^2 - 9.33 T^3 + 0.18 T^4 \dots\dots\dots (5)$$

$$N = 14 \quad df = 9 \quad F = 5.06 \quad R^2 = 0.6922$$

2. Tea

$$Y_{Te} = -103.84 + 89.64 T - 6.21 T^2 + 0.12T^3 \dots\dots\dots (6)$$

$$N = 20 \quad df = 16 \quad F = 39.50 \quad R^2 = 0.8810$$

$$L_{Te} = 48.30 - 6.16 T + 0.37 T^2 - 0.007 T^3 \dots\dots\dots (7)$$

$$N = 20 \quad df = 16 \quad F = 15.73 \quad R^2 = 0.7468$$

$$CS_{Te} = 1121.10 - 379.20 T + 47.17 T^2 - 2.28 T^3 + 0.04 T^4 (8)$$

$$N = 20 \quad df = 15 \quad F = 7.348 \quad R^2 = 0.6621$$

3. Lychee

$$Y_{Le} = e^{4.28 T^{0.65}} \dots\dots\dots (9)$$

$$N = 10 \quad df = 8 \quad F = 27.24 \quad R^2 = 0.7744$$

$$L_{Le} = 52.20 - 15.30 T + 1.80 T^2 - 0.06 T^3 \dots\dots\dots (10)$$

$$N = 15 \quad df = 11 \quad F = 11.46 \quad R^2 = 0.7576$$

$$CS_{Le} = 1205.50 - 544.71 T + 102.07 T^2 - 7.56 T^3 + 0.20 T^4 (11)$$

$$N = 15 \quad df = 10 \quad F = 13.32 \quad R^2 = 0.8420$$

where :

- Y = production (kg/rai/year)
- L = labor use (mandays/rai/year)
- CS = input cost (baht/rai/year)
- Co = Coffee (dry beans)
- Te = Tea (fresh leaves)
- Le = Lychee (fruits)
- T = age of tree (year)

All parameters estimated are significant at 5 percent level.

The estimates of production, labor use, input cost, and gross income over 20 years for coffee, tea and lychee are in Appendices 3, 4 and 5, respectively.

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III.3 Family Expenditure

Table 9 shows the actual expenditure and saving for each group of farmers. Regarding expenditure, the villagers spend their income primarily for food. Most of them pay more than 80 percent of their expenses for food consumption. Some farmers also have money left or saving which is usually used for buying inputs for the following year, but some farmers borrow credit in kind (seeds, fertiliser and chemicals) from TA-HSDP and repay it at the same year after harvesting their crops.

Table 9. The average family expenditure for each group, in 1990

Group No	Expenditure (baht/family/year)						
	Food	Medical	Cloth	Ceremony	Other	Total	Saving
2	11476 (88.61)	125	675	200	475	12951	0
3	13160 (85.48)	230	680	375	950	15395	1000
4	12974 (87.34)	180	800	250	650	14854	1300
5	11274 (86.23)	170	630	250	750	13074	0
6	11358 (87.18)	170	825	225	450	13028	1250
7	10670 (86.78)	150	650	225	625	12295	0
8	11454 (90.70)	125	475	200	375	12629	500
9	9950 (91.49)	125	350	150	300	10875	0
10	11998 (88.87)	150	550	200	600	13498	1333
11	10667 (91.43)	175	275	250	300	11667	0
13	11750 (85.14)	200	750	300	800	13800	0
14	13231 (80.28)	250	900	600	1500	16481	1430
16	19275 (78.11)	400	1500	1000	2500	24675	2250
17	10600 (91.38)	100	350	150	400	11600	1000
18	21710 (83.63)	500	1000	750	2000	25960	5000
19	11750 (74.13)	200	900	500	2500	15850	1500
20	12390 (71.45)	200	1500	750	2500	17340	3500
22	14180 (84.76)	350	600	400	1200	16730	0

Values in parentheses are percentage of the total family expenditure

The estimation of family's expenditure equation (1) is presented as follows.

From the values of human body needs (adult), food basic needs per adult per year can be calculated as follows:

1. Carbohydrate		
120.45 kg of rice x 5.00 baht	=	605.25 baht
2. Fat (vegetable)		
26.755 kg of vegetable fat x 32 baht	=	856.16 baht
3. Protein		
- 6.9 kg pork meat x 40 baht	=	276.00 baht
- 8.03 kg chicken x 35 baht	=	281.05 baht
- 2.53 kg salted fish x 25 baht	=	63.25 baht
- 2.53 kg canned fish x (5/0.014) baht	=	903.57 baht
T o t a l (food basic needs)	=	2982.28 baht

The average expense for cloth in the study area is 787.86 baht/family/year or 179.90 baht/adult/year. Total payment for medical treatment is 171.21 baht/family/year or 39.10 baht/person/year and for ceremony is 296.21 baht/family/year.

Therefore, the basic needs of family equation in the study area can be written as :

$$\text{BNS} = 296.21 + 39.10 \text{ FS} + 3162.18 \text{ ADEQ} \dots\dots (12)$$

where :

- EXP = family expenditure per year (baht)
- FS = family size (person)
- ADEQ = total adult equivalent per family (person)

After running regression in order to estimate marginal propensity to consume by using restricted least squares method, the estimated expenditure equation is:

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$$\text{EXP} = 296.21 + 39.10 \text{ FS} + 3162.18 \text{ ADEQ} + 0.2014 \text{ INC} \quad (13)$$

$$N = 66 \quad R^2 = 0.7644 \quad F(1,65) = 210.255 \quad (t_{\text{ratio}} = 30.733)$$

where :

INC = family gross income per year (baht)

(also see Appendix 6 for detail estimation)

$$\text{or can be written as : } \text{EXP} = \text{BNS} + 0.2104 \text{ INC} \quad (14)$$

Basic needs (BNS = $296.21 + 39.10 \text{ FS} + 3162.18 \text{ ADEQ}$) per family for each year can be calculated using family size (FS) and total adult equivalent per family (ADEQ) which is based on the growth of family size and age of family member every year (Appendix 7). Therefore, basic needs is a predetermined variable in this model.

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