

CHAPTER VII

FACTORS AFFECTING HOUSEHOLD FOOD SECURITY

This chapter explains sources of household food flows among Tharu communities and its contribution to household food security. Household food adequacy level is important for assessing food security of household. Consequently, a household food adequacy model was designed using ordinary least square regression to analyze relative significance of different factors on household food adequacy as percentage of total requirement met by household. At the end of the chapter seasonality and food security, rich picture and food coping strategies of household are discussed.

7.1 Sources of household food flows among Tharu ethnic communities

Assessing the household food security, it is important to identify the sources of household food flows (inflows and outflows) into each of household food stock. Production capacity and purchasing capacity of household determines mainly the sources of food inflows and outflows in each household.

7.1.1 Sources of household food inflows among Tharu ethnic communities

The production from own farm, food stock of last year, food received from relative and in kind from wages, purchased from market were found the sources of food inflows among Tharu ethnic communities. On the sources of food inflows side, 86 per cent, 7 per cent, 4 per cent and 3 per cent of total food inflows was entered from own production, stock of last years, market and others (relatives and wages) respectively into household food stock (Table 7.1). The household who saved the

stock of last year were found to have a better food security status. Saving the food stock especially maize for two to three year who has more cereal in their house, was found as their culture in study sites.

Table 7.1 Sources of household food inflows

Status	Production	Stock	Purchase	Others	Food inflows
.....Cereal food grain kilograms per household per year.....					
Food secure	3,931 (87)	564 (13)	0	0	4,495 (100)
Marginally food secure	1,992 (89)	64 (3)	107 (5)	73 (3)	2,236 (100)
Food insecure	1,232 (79)	0	181 (12)	202 (8)	1,615 (100)
Average	2,358 (86)	202 (7)	97 (4)	93 (3)	2,751 (100)

Note: Figures in parenthesis indicates the percentages of total sample in each category.
Source: Survey, 2007

7.1.2 Sources of household food outflows among Tharu ethnic communities

Out of total food inflows, six per cent of food was found as food stock for next year in food secure and marginally food secure households among Tharu ethnic communities which was remained into household food stock. As a result, average food outflow of total households was 2,586 kg per household per year which was less than six per cent of average food inflow of total households. The consumption, food for making alcohol, food sold in the market, feed to livestock, seed for planting, given to other and uses for festival and ceremony were found the sources of household food outflows among Tharu ethnic communities. On the sources of household food outflows side, 54 per cent, 22 per cent and 13 per cent of total food outflows was gone out for consumption, sale and cereal for making alcohol respectively from household food stock (Table 7.2). Furthermore, four per cent, three per cent and two per cent of total food outflows was gone out for seed, festival and ceremony and animal feed

respectively from household food stock. Two per cent of total outflow were gone out for fixed kind payment in term of cereal food to occupational caste (tailor, blacksmith and shoe maker) that provided their occupational service based on their annual demand for services from each of the occupational caste groups to needy households and traditional service providers nominated within Tharu community to provide traditional services who get certain amount of cereal grain as remuneration for their service to the community.

Table 7.2 Sources of household food outflows

Status	Uses for consumption	Sale	Alcohol making	Other	Food outflows
.....Cereal food grain kilograms per household per year.....					
Food secure	2,056 (51)	1,125 (28)	490 (12)	394 (10)	4,065 (100)
Marginally food secure	1,254 (58)	359 (17)	295 (14)	249 (11)	2,157 (100)
Food insecure	901 (56)	216 (13)	268 (17)	230 (14)	1,615 (100)
Average	1,393 (54)	556 (22)	348 (13)	289 (11)	2,586 (100)

Note: Figures in parenthesis indicates the percentages of total sample in each category.
Source: Survey, 2007

7.2 Household food flows among Tharu community's food secure households

On the sources of food inflows side among Tharu community's food secure households, 87 per cent and 13 per cent of total food inflows was entered from own production and stock of last years respectively into household food stock. Food secure households were not dependent on relatives and the market due to their own sufficient production. Out of total food inflows among Tharu community's food secure households, 10 per cent of food was found as food stock for next year in food secure households which were remained into household food stock. As a result, average food outflow of total households was 4,065 kg per household per year which

was less than 10 per cent of average food inflow of total households. On the sources of household food outflows side, 51 per cent, 28 per cent and 12 per cent of total food outflows was gone out for consumption, sale and cereal for making alcohol respectively from household food stock (Table 7.2). The Figure 7.1 demonstrates the sources of household food flows among Tharu community's food secure households.

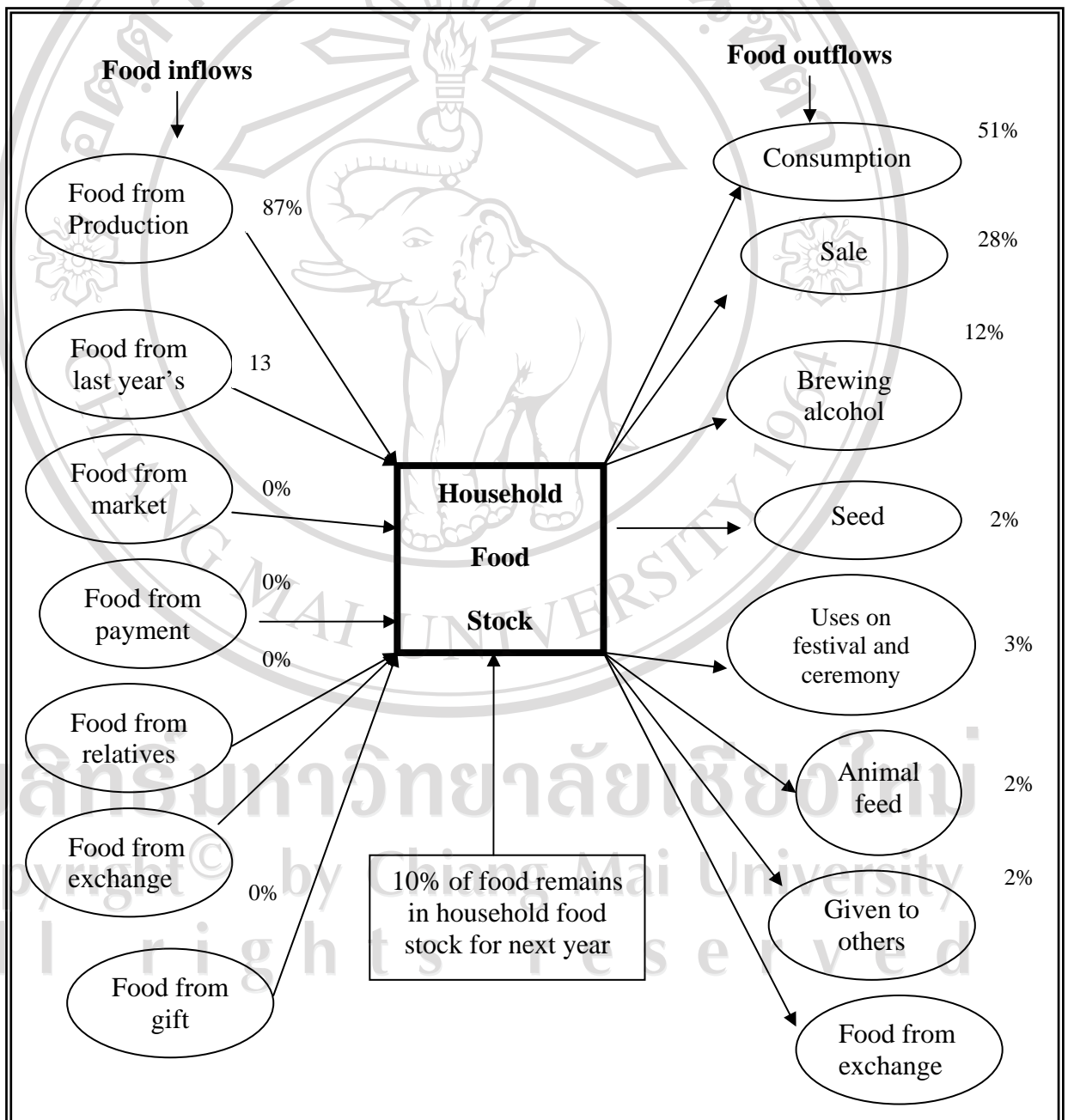


Figure 7.1 Household food flows among Tharu community's food secure households
Source: Survey, 2007

Furthermore, two per cent, three per cent and two per cent of total food outflows was gone out for seed, festival and ceremony and animal feed respectively from household food stock. Two per cent of total outflow was gone out for fixed kind payment in term of cereal food to occupational caste and traditional service providers.

7.3 Household food flows among Tharu community's marginally food secure households

On the sources of food inflows side among Tharu community's marginally food secure households, 89 percent, three per cent, five per cent and three per cent of total food inflows was entered from own production, stock of last years, market and others (relatives and wages) respectively into household food stock (Figure 7.2). Marginally food secure households were dependent upon food collected from wages and relatives and market due to their own insufficient production. Out of total food inflows among Tharu community's marginally food secure households, four per cent of food was found as food stock for next year which was remained into household food stock. As a result, average food outflow of total households was 2,157 kg per household per year which was less that four per cent of average food inflow of total households. The consumption, food for making alcohol, food sold in the market, feed to livestock, seed for planting, given to other and uses for festival and ceremony were found the sources of household food outflows among Tharu ethnic communities. On the sources of household food outflows side, 58 per cent, 17 per cent and 14 per cent of total food outflows was gone out for consumption, sale and cereal for making alcohol respectively from household food stock. Furthermore, three per cent, three per cent and two per cent of total food outflows was gone out for seed, festival and ceremony and animal feed respectively from household food stock. Three per cent of

total outflow were gone out for fixed kind payment in term of cereal food to occupational caste groups and traditional service provider groups.

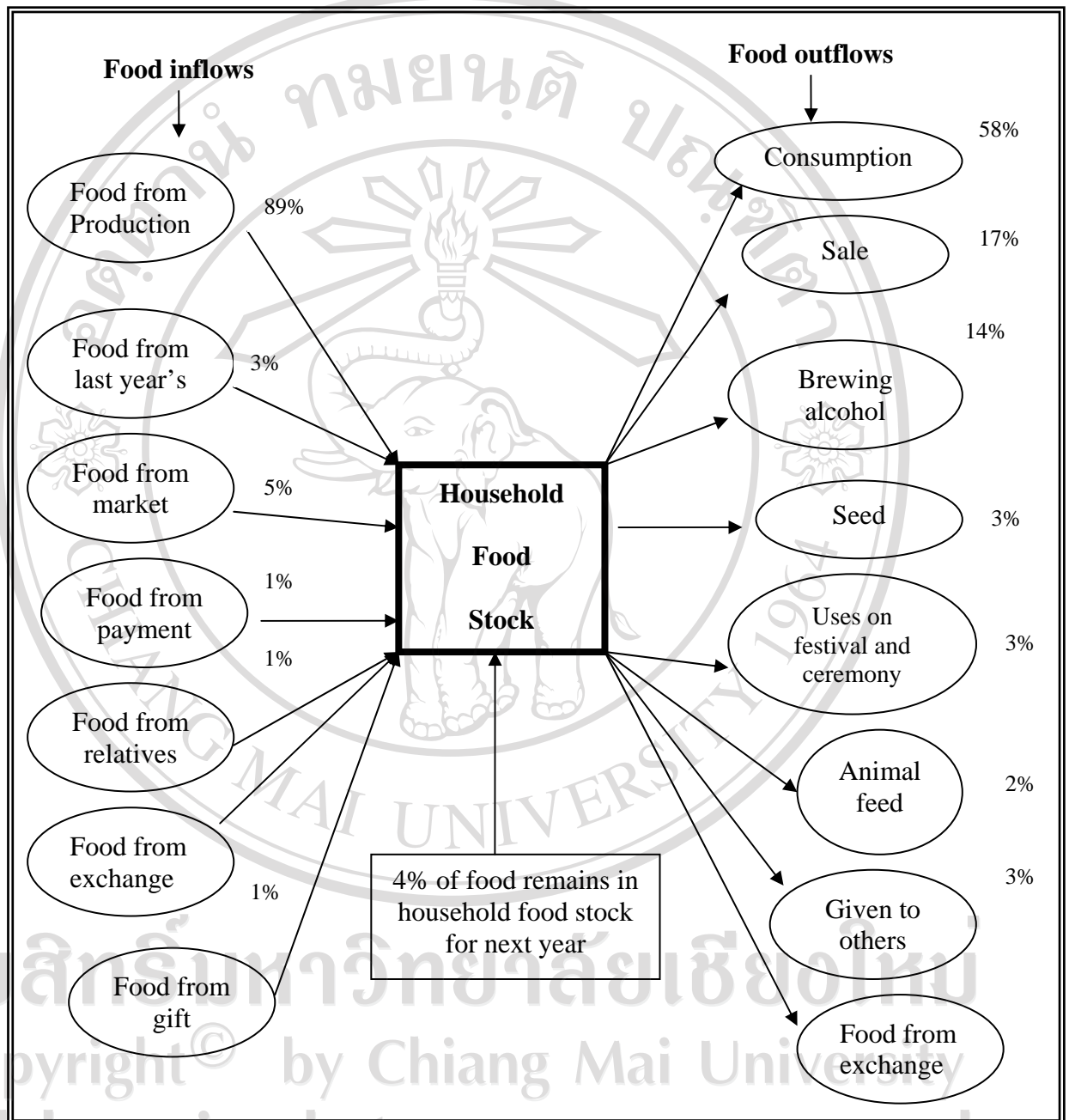


Figure 7.2 Food flows among Tharu community's marginally food secure households

Source: Survey, 2007

7.4 Household food flows among Tharu community's food insecure households

On the sources of food inflows side among Tharu community's food insecure households, 86 percent, seven per cent, four per cent and three per cent of total food

inflows was entered from own production, stock of last years, market and others (relatives and wages) respectively into household food stock (Figure 7.3).

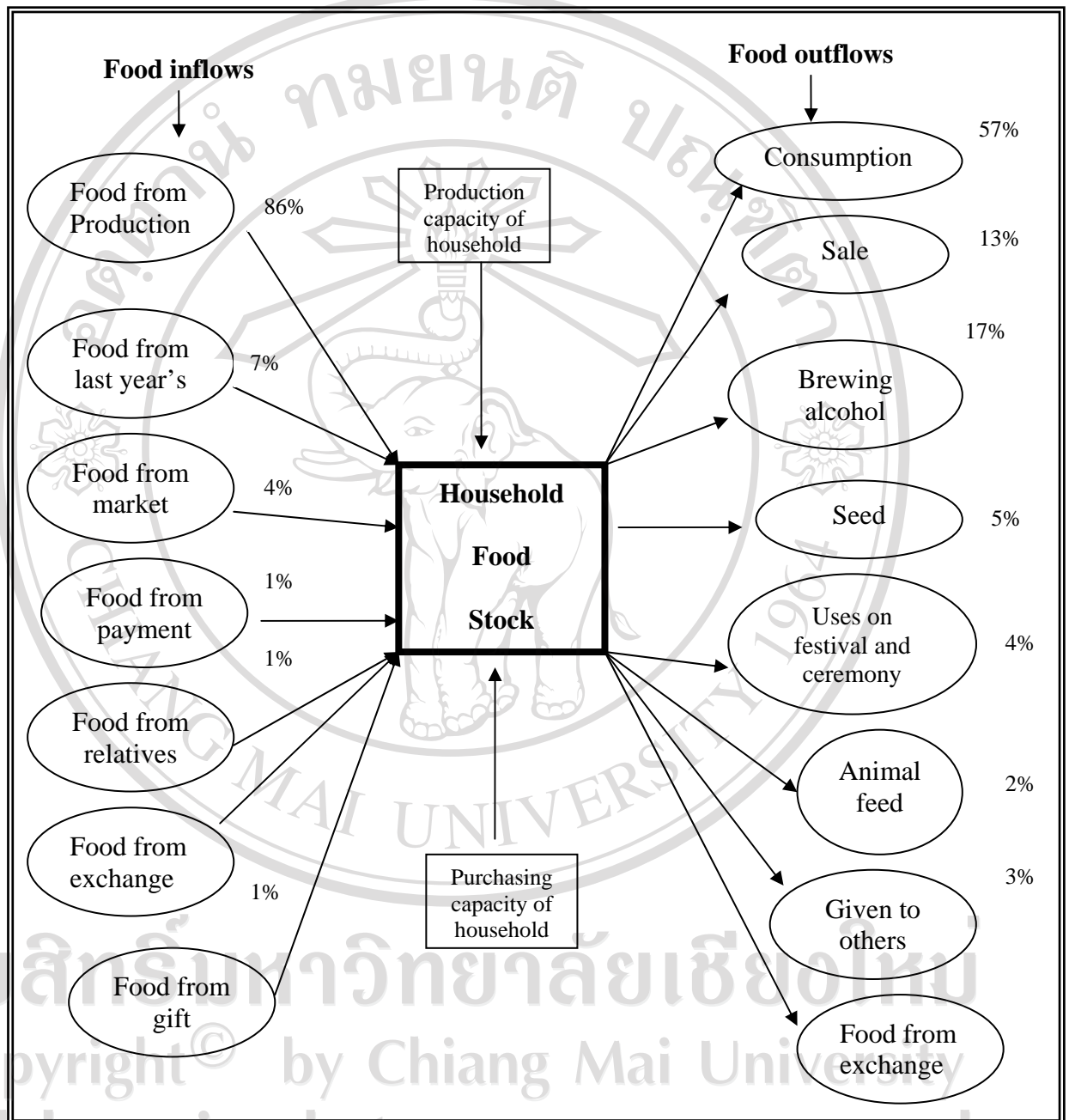


Figure 7.3 Household food flows among Tharu community's food insecure households

Source: Survey, 2007

Food insecure households were also dependent upon food collected from wages and relatives and market due to their own insufficient production. Out of total

food inflows among Tharu community's food insecure households, no food was found as food stock for next year in food insecure households among Tharu ethnic communities. As a result, average food outflow of total households was same as total inflow that is 1,615 kg per household per year. On the sources of household food outflows side, 57 per cent, 13 per cent and 17 per cent of total food outflows was gone out for consumption, sale and cereal for making alcohol respectively from household food stock. Most of food insecure households were found to make use of low quality local seed stored in their house at higher seed rate for planting in their field. Consequently, five per cent of total outflow was spent as seed for planting. Furthermore, four per cent and two per cent of total food outflows was used for festival and ceremony and animal feed respectively from household food stock. Three per cent of total outflow were gone out for fixed kind payment in term of cereal food to occupational caste and traditional service providers.

7.5 Household food security from sources of household food flows

It is important to analyze what proportion of household food security situation can be obtained after changing existing sources of household food flows used for non consumption purpose into food consumption use of their households. Based on sources of household food flows, the tendency of their traditional practices of food uses for non consumption purpose can be assessed and suggested for improving food security situation of the households among Tharu ethnic communities. Household cereal production covers significant contribution in household food inflows which is utilized for both own consumption and non-consumption purpose in term of food outflows. For the contribution of food inflow side, 86 per cent, seven per cent, four per cent and three per cent of total food was derived from own production, stock of

last years, market and others respectively. The Tharu farmers use their food received from food inflows in term of food outflows for consumption as well as non consumption use where as non food use is used by selling product for income, preparing alcohol and using seed, feed and others. Food for consumption was found 54 per cent of total their production where as 22 per cent for sale in the market, 13 per cent for preparing alcohol and remaining 11 per cent for seed, animal feed and other uses.

Table 7.3 Household food security from sources of household food outflows

Household food security	Food secure households	Marginally food secure households	Food insecure households
Food consumption	23 (32)	25 (35)	24 (33)
Consumption plus cereal for brewing alcohol	38 (53)	16 (22)	18 (25)
Consumption plus quantity of cereal for brewing alcohol plus quantity of sold cereal	49 (68)	10 (14)	13 (18)
Total food inflows	54 (75)	10 (14)	8 (11)

Note: Figures in parenthesis indicates the percentages of total sample in each category.

Source: Survey, 2007

It was found that use of cereal for alcohol and the sale of cereal immediately after harvesting could not meet household food security from remaining portion of their own production. If Tharu household could consume the quantity of cereal made for alcohol as food adding with pervious consumption, it would make 53 per cent and 22 per cent of them to be food secure and marginally food secure households respectively. If Tharu household could consume the quantity of cereal made alcohol plus quantity of sold cereal as food adding with pervious consumption, it would make 68 per cent and 14 per cent of them to be food secure and marginally food secure

households respectively. If Tharu household could consume the quantity of all household food outflows as food consumption, it would make 75 per cent, 14 per cent and 11 per cent of them to be food secure, marginally food secure and food insecure households respectively (Table 7.3).

The households who are marginally food secure and food insecure are using cereal for brewing alcohol as a tradition and also some per cent selling it immediately after harvesting at lower price to pay price of production inputs used for agriculture especially landlords are important factors affecting food insecurity in Tharu communities. Some awareness programs to minimize the uses of cereal for making alcohol and some additional employment opportunity to minimize selling their product in market may be good instruction toward sustainable food security in these communities.

7.6 Factors affecting household food adequacy

The household food adequacy reflect food security situation of household which is measured as percentage of household food requirement. If household food adequacy is more than or equal 100 per cent which can be said as food secure household. National minimum per capita daily energy requirement is 2,250 kilocalories according to national planning commission. Based on national minimum per capita daily energy requirement, their food adequacy was calculated to identify food security status of household. In this study, household food adequacy was estimated only by cereal consumed by household annually. Accordingly, factors contributing household food adequacy is the same as factors contributing food security situation of household. It is most important to identify and assess factors contributing household food adequacy which assist to address issues of these factors

by development agencies, policy maker and researcher for development intervention in the future.

In the direction of assessing significant factors contributing household food adequacy, an ordinary least square (OLS) regression model was chosen and run. For that reason, regression model discussed earlier (chapter III equation 10) was selected for analysis of factors affecting household food adequacy. The coefficient of each variable derived from analysis was applied to understand the relative contribution of each variable in mean of household food adequacy as percentage of household food requirement. The factors (variables) were characterized by their expected results.

While using household food adequacy regression model, it was observed that using all the variables above in the original model resulted in a very high R^2 but with none of them being significant, multicollinearity was detected. Pair wise correlations were done in the removal of the variables. In order to reduce severity of collinearity problem, some of selected variable were changed into the term of adult equivalent (AE) scale (see Appendix 5). New household food adequacy regression model was created by the use of these variables even though some of independent variables were detected as multicollinearity problem. To reduce severity of collinearity problem, some of highly correlated variable are dropped and new equation of model was formed and analyzed. After analysis, following results were found (Table 7.4).

7.7 Results of Ordinary Least Square (OLS) regression analysis

The results of the household food adequacy using household food adequacy as percentage of requirement met by household are given in Table 7.4. The R^2 value explains how much variation in the dependent variable is explained by the independent variables. The adjusted R^2 says the same but is adjusted for degree of

freedom and statistics will be used here. The adjusted R^2 is explained 0.483 meaning 48.3 per cent of the variation in food household adequacy is explained by the given independent variables. The Durbin-Watson statistics is 1.995 suggesting that there is no autocorrelation and the residuals are independent of each other.

Table 7.4 Results of Ordinary Least Square (OLS) regression analysis

Variables	Unstandardized Coefficients		Standardized Coefficients	T-ratio	Sig. level
	B	Std. Error	Beta		
(Constant)	69.951	8.290		8.437	.000
Household adult equivalent (AE) members (X_{hs})	.619	.798	.088	.775	.441
Household head age (X_{age})	.031	.187	.019	.168	.867
Access to extension service (D_{ext})	12.596	4.844	.289	2.600	.012**
Adoption of modern variety of rice (D_{tech})	17.276	5.108	.366	3.382	.001***
Yield stability in CV (X_{ys})	.200	.471	.036	.425	.673
Income per AE (X_{in})	.005	.003	.183	1.886	.064*
Traditional practice (Ratio of alcohol making cereal to consumed cereal) (X_{tp})	-16.227	9.441	-.155	-1.719	.091*
Farm size per AE (X_{fs})	49.179	40.147	.125	1.225	.225

$R = .736$, $R^2 = .541$, Adjusted $R^2 = .483$ and Durbin-Watson statistics = 1.995

*=Significance at the 0.1 level **=Significance at the 0.05 level and ***=Significance at the 0.01 level

Dependent Variable: Household food adequacy as percentage of household food requirement met by household

Source: Regression analysis from survey data, 2007

The results shown in Table 7.4 among selected independent variables, adoption of regular modern rice variety seed (the 0.01 level of significance), access to

extension (the 0.05 level of significance), total income including both farm and farm income (the 0.10 level of significance) and ratio of alcohol making cereal to consumed cereal (the 0.10 level of significance) were found significant contributors to the household food adequacy. But yield stability, household adult equivalent members, farm size, Household head age do not significantly affect household food adequacy.

7.7.1 Adoption of modern variety of rice

It was expected that access to adoption of modern rice seed relates to better production and affect significantly to household food adequacy. It was found that the adoption of regular modern rice variety seed affect significantly to household food adequacy at the 0.01 level of significance level. Based on the standardized beta coefficient of regression computation which is derived from subtracting mean by observed value of each independent variable and dividing by its standard deviation showed positively relation with adoption of regular modern rice variety seed, with beta coefficient 0.366, clarify relatively higher variation in the household food adequacy. The adoption of modern rice variety seed is important to receive higher production and finally household food supply of rice where major contribution of household calorie consumption comes from rice. Most of the modern rice varieties recommended by extension workers are adopted by farmers who have higher income and land resources. Majority of Tharu farmers are small land holder who can not afford to buy modern variety of rice seed due to lack of income and land resource. Consequently, they use traditional rice seed in their farm which make low production and then food insecure.

7.7.2 Access to extension service

It was expected that access to extension services develop skills for better production and lead to household food adequacy relates to better production and affect significantly to household food adequacy. It was found that access to extension services affect significantly to household food adequacy at the 0.05 level of significance level. Poor Tharu farmers have no sufficient time to acquire extension services due to their heavy work load. Some of them have no interest to gain to extension services due to low level of education and awareness toward new technology.

7.7.3 Higher income

It was expected that higher income from crop production is expected to give more household food adequacy. It was found that higher income affect significantly to household food adequacy at the 0.10 level of significance level. Majority of Tharu farmers have less income and no sufficient expenses for production inputs which affect production level and ultimately food security situation.

7.7.4 Proportion of food grain for making alcohol

It was expected that higher proportion of food grain for making alcohol leads to be household food inadequacy. It was found that higher income affect negatively significantly to household food adequacy at the 0.10 level of significance level. The proportion of food grain for making alcohol is higher in each category of households which leads to high rate of food insecurity.

7.7.5 Household head age

It was expected that young people are stronger and are expected to cultivate larger-size farm than old people. Within limits, households headed by younger heads

are more likely to meet their household food adequacy. It was found that household head age does not affect significantly to household food adequacy.

7.7.6 Household adult equivalent members

It was expected that large households are likely to meet less of their household food adequacy than households with fewer members. It was found that household adult equivalent members does not affect significantly to household food adequacy.

7.7.7 Yield stability

It was expected that yield stability is measured by coefficient of variation of yield since last five years. Higher coefficient of variation denotes to be household food adequacy. It was found that yield stability does not affect significantly to household food adequacy.

7.7.8 Farm size

It was expected that the larger the farm size, the higher the production level. It is expected that households with larger farm size are more likely to be food secure than those with smaller farm size. It was found that the farm size does not affect significantly to household food adequacy.

7.8 Seasonality and household food security

Most of Tharu communities' households were found to have in agriculture as their main occupation excluding 10 per cent who were off farm profession like daily wage labor, skilled labor, fishing fish from natural resources and netting the bamboo items in the study area. The naturally time concentrated crops like field crops vegetable and fruit crops are harvested over short period of time which indicates seasonality in agricultural production. This type of production system establishes variation in the food security and food consumption pattern along with farm income

and expenditure pattern of the households. Cereal crops like paddy and maize are grown in rainy season and harvested in winter season (after rainy season) which covers 86 per cent and nine per cent respectively in the study area. Wheat is grown in winter season and harvested during beginning of summer season which covers only five percentage of total cereal consumption. The summer paddy is also grown in 17 per cent of the study area which is harvested during August. Accordingly, the level of food insecurity is observed in pre harvest (lean) season as food deficit season.

Food consumption pattern was found variation by the season. Winter season is time of harvesting rice and maize and big festival like *Maghi* also take place during this season. Rice, meat, fish, fruit, winter vegetable and dairy product were found abundantly in most of the households. During summer season, dry vegetable like *sinki* (fermented radish) and *papro* (dried leafy vegetable) were used especially in household of rainfed areas. Wild vegetables like *Chyau* (mushroom), *neuro* (fern), *mate* (Amaranthus) and *tarul* (yam) and fruits were collected from forest, public land and rivers during summer and rainy season. They stopped to gather wild food from forest last ten years due to political instability in the country but currently they resumed collecting food from the forest. Fishing is done from natural water resources like river, stream and pond during rainy and winter season. Snail and crab from paddy field is collected during rainy season. Those households, who have no sufficient rice throughout the whole year, consume rice mixed with maize or maize only called locally *Aato*. Moreover, they cook 1.5 times weight of rice with four times weight of water and prepare food called *Maar/maad* to adjust food and minimize consumption of rice.

For farm income, winter season (October to January) was found to be the time of selling maize, paddy, oil crops like rape seed and mustard in addition to summer season (April to May) is time for selling wheat and pulse crop especially lentil which were period of earning higher farm income than rainy season (June to September) (Table 7.5).

It was found that expenditure was higher in rainy season due to purchase of fertilizer, pesticides and seeds for rainy crops (paddy and maize). It had been a practice to exchange labor during planting and harvesting time which results too little expenditure on labor. Expenditure was found little bit higher in months of January and February due to their big festival called *Maghi* which is celebrated one week to two months based on decision of community leader called *Matawan*.

Table 7.5 Seasonality and food food security

Season	Rainy				Winter				Summer			
	June	July	August	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May
Major crops	Paddy				Wheat				Summer vegetable			
<i>Irrigated</i>	Paddy				Wheat				Summer vegetable			
<i>Rainfed</i>	Maize				Mustard/lentil				Fallow			
Food adequacy	Low				High				Medium			
Wastage of labor	Low				Medium				High			
Income	Low				High				Medium			
Expenditure	High				Low				Medium			
Insect/pest	High				Medium				Low			

Source: Survey and workshop, 2007

Labor force is found abundantly in study area where no scarcity of labor even in peak period. Planting to harvesting time of paddy during rainy season is the peak

period for labor use. Seasonal labor was found being practiced during off farm season time in the study area (Figure 7.4).

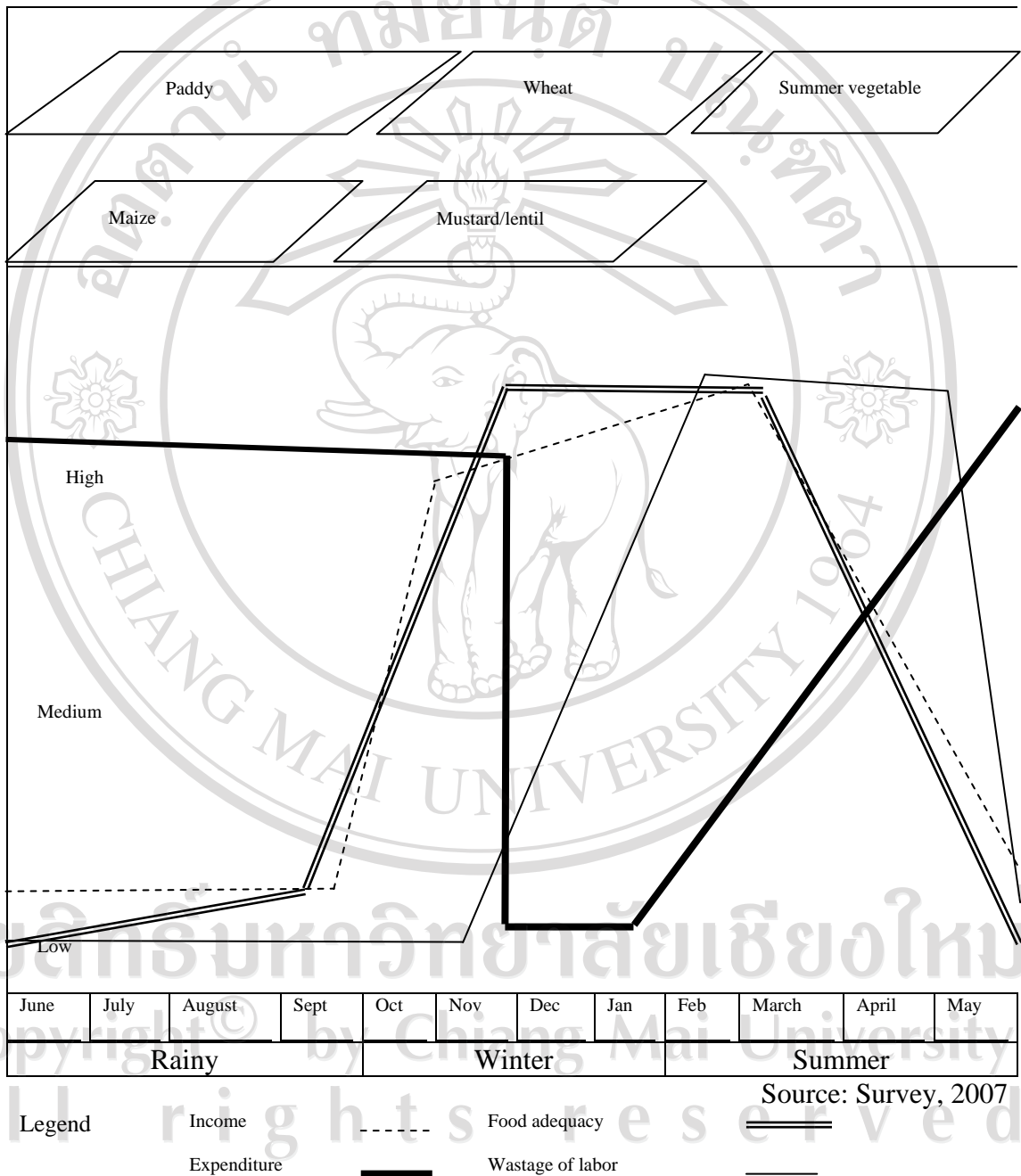


Figure 7.4 Factors affecting seasonality of food security situation

Source: Survey and workshop, 2007

7.9 Rich picture of food insecurity situation of Tharu ethnic communities

The performance of existing production systems and their factors, income, expenditure and consumption patterns of every household determines the food security or food insecurity situation of particular household. The objective of this rich picture was to find out different responsible factors for food insecurity of Tharu ethnic communities which helps to better understand and select appropriate means of intervention with an aim for improving food security on Tharu ethnic communities. Household food inadequacy was taken as core problem for food insecurity of Tharu ethnic communities. All these responsible factors were documented on each community workshop and described on the rich picture (Figure 7.5)

Low productivity, low land holding, traditional consumption practices, subsistence agriculture, low income, were found factors which caused household food inadequacy for food insecure households. Low productivity was caused by lack of quality fertilizer, inadequate irrigation facilities, low input use and negligible use of organic manure. Low land holding was caused by higher household size and low purchasing capacity of land and sharecropping was caused by land tenure system.

Household food inadequacy was caused by traditional consumption practices due to higher use of food on ceremony and festival as well as alcohol making. Food inadequacy was also caused by low income and low income was caused by low price of agricultural produce, lack of employment opportunity and lack of productive assets moreover, lack of employment opportunity was caused by lack of skill of knowledge, lack of vocational training and lack of mobility. Bad climate condition was also found factors responsible for food insecurity due to flooding, draught and excessive

7.10 Food coping strategies of household

The food shortage households espouse different strategies to cope with food scarcity in their households. Food coping strategies differs on the basis of degree of food scarcity, availability of potential alternatives and their resource in the study area. According to Maxwell and Frankenberger (1992), coping strategies of household against food insecurity vary by region, community, social class, ethnic group, gender, age and the season. Food coping strategies make available basis for food security improvement interventions addressing issues faced by the food insecure households.

Food coping strategies were documented by both community workshop and household surveys which can be divided into consumption strategies, expenditure strategies and income strategies.

7.10.1 Consumption strategies

1. Mixing maize with rice for food
2. Preparing *maar/maad* (rice soup) for food in which 1.5 kg rice is boiled in four liters of water to make rice soup which works as 4 kg of rice to minimize hunger.
3. Preparing *Aato/Darya* (food of maize flour) food which is prepared only from maize flour and granules
4. Fishing the natural fish to exchange with food grains
5. Minimizing alcohol making from cereal grain
6. Searching wild food from forest and streams
7. Searching snail and crab from rice fields.
8. Drinking *Jaara/Jand* (locally brewed alcohol) from other houses that eat only one third quantity of food than normal time.

7.10.2 Expenditure strategies

1. Cutting expenditure on other non-food activities to purchase food
2. Purchasing the food from market
3. Saving and storing crop products especially maize since last 2-3 years and using it during famine time when food scarcity occurs.
4. Cutting some quantity of meal
5. Cutting the expenditure during festival and ceremony period

7.10.3 Income strategies

1. Receiving grain from relatives or others
2. Working within community in kind as a wage.
3. Selling small live animals to buy food grains
4. Doing seasonal labor during off farm season
5. If seasonal labor is not sufficient from male members, women go for labor (indoor work)
6. Engaging foreign employment (India and gulf countries) and
7. Selling self made bamboo basket, mattress and other bamboo and straw made items with food grains

In this chapter, 86 per cent, 7 per cent, 4 per cent and 3 per cent food were found source of food inflows from own production, stock of last years, market and other sources respectively where as the sources of outflows from the consumption (55%), sold in market (24%), cereal brewing for alcohol (13%), seed (3%) and feed (2%) in Tharu ethnic communities. It can be concluded that use of cereal for alcohol making and the sale of cereal immediately after harvesting could not meet household food security from remaining portion of their household food outflows. The food

insecure households are using cereal for brewing alcohol as a culture and also some per cent selling it immediately after harvesting at lower price to reimburse price of production inputs used for agriculture. Controlling misuse of cereal and minimizing to sell their product by some additional employment opportunity may be good instruction toward improving food security in these communities.

Adoption of regular modern rice variety seed, access to extension, total income including both farm and farm income and ratio of alcohol making cereal to consumed cereal were found significant contributors to the household food adequacy. Food consumption pattern, farm income, expenditure pattern and availability of labor and food adequacy vary according to season. The different factors determines the food security situation of particular household which can be mapped through rich picture was to find out different responsible factors for food insecurity of Tharu ethnic communities which helps to choose appropriate means of intervention for improving food security on Tharu ethnic communities. The food shortage households adopt different strategies to cope with food scarcity which make available basis for food security improvement interventions addressing issues faced by the food insecure households.