

# Determinant of Food Security on Upland Agriculture Households in Paletwa Township, Chin State of Myanmar

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## ABSTRACT

This study aims to determine food security on upland agriculture households in rural area. Food security is concerned with the first two main goals of Sustainable Development Goals, No Poverty and Zero Hunger. Myanmar is Food Insecure State that showing 14.2% that is 7.7 million of 51 million population. Chin state is least developing and Paletwa is poorest out of 324 townships. Research is applied by both qualitative and quantitative approaches. 3 Villages and 1 Quarter are chosen for qualitative method and 141 upland agriculture households are selected for field survey using random sampling method. The data are analyzed by logistic regression in SPSS 17 to determine food security. Age, education, schooling years of household head, size, second occupation and no. of working people in households are socio-economic determinant and own food production and fruit access are food security determinant.

## KEYWORDS

Chin State of Myanmar, Food Security, Logistic Regression, Upland Agriculture Households

## INTRODUCTION

“Food Security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (Food and Agriculture Organization[FAO], 1996). “It is now estimated that in 2009, there are 1.2 billion food insecure individual- the one sixth of world population”. (Canadian International Development Agency [CIDA], 2015). However, “during the past year, Food Security has improved almost in every region of the world”. (Global Food Security Index [GFSI], 2015). The researcher from Asia and Pacific Policy Studies agrees with Global Food Security Index. “Both Southeast Asia and developing East Asia have made enormous progress in lowering food insecurity in the past two decades, with prevalence dropping by 18.7 percentage points and 9.3 points, respectively”. (Timmer, 2014). In 2015, Myanmar’s Food Security ranking is 78 with the overall score of 44.00. Compared with 2014, Myanmar increase food security +7.7 overall score that is the most increasing country after Egypt (Global Food Security Index [GFSI], 2015). Although Myanmar is middle food insecure country, Chinese scholars mentions Myanmar is less production country. “There are also countries that have favourable climates but produce less than average amount food per person: Bosnia and Herzegovina, El Salvador, Gabon, Georgia, Indonesia, Jamaica, and Myanmar” (Yu & You, 2013).

The Heads of State and Government and High Representatives, meeting at United Nations Headquarters in New York from 25 to 27 September 2015 as the Organization celebrates its seventieth

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anniversary, have decided Sustainable Development Goals with 169 associated targets which are integrated and indivisible “We are determined to end poverty and hunger in all their forms and dimensions, and to ensure that all human being can fulfil their potential in dignity and equality and in a healthy environment” (United Nations [UN], 2016). Food Security is sorely related with Sustainable Development Goals [SDG]. In their second SDG, Zero hunger extends to end hunger, achieve food security promote sustainable agriculture. This study will fulfil a tiny piece of this goal in study country, Myanmar.

In Myanmar, there are 5.7 million ha cultivated land that is 12.89% of the total land area of 676,578 sq.km (Myanmar Agriculture Census, 2003), but the World Bank reveal that cultivated land is 19.3% of the total land area (World Bank Group, 2013). 66% of the total population 51 million still live in rural area (FAO, 2015). Agriculture contribute 60% to Gross Domestic Product [GDP] and employ 65% of the population. (Encyclopedia of the Nations, 2016) Therefore almost all rural population engage in agriculture. Out of 14 States and Regions, Chin is least developing region. It has 0.5 million population and mostly settlement in rural area (Myanmar Institute of Integrated Development [MIID], 2014). The poverty rate is 73% and food insecurity rate is up to 52%. “Food insecurity is therefore a cyclical and chronic problem, which affects all townships of the State. The result of the 2013 World Food Programme [WFP] food security monitoring in Chin State showed that the food insecurity levels in the State ranged from moderate to severe” (World Food Program, 2013) “Chin has the smallest average and median rural land holding, 2.1 and 2.0 acre, respectively” (United Nations Development Program, 2015).

## RESEARCH METHODOLOGY

### Study Area

Myanmar is one of Association of Southeast Asian Nations [ASEAN] Country. It totally bases on agriculture. It has 51 million population on 676,578 sq.km which is the largest land area after Indonesia in Southeast Asia. She has tropical monsoon climate. The average temperature is from 22°C to 27°C year-round. The seasons can be categorized as: The cold and dry season, the hot-dry season and the wet season. Agriculture shares the economy constituting 44% of the GDP and 35% of export earnings. Total cultivated land is 18 million hectares. Rice, beans, pulses and sugar cane are the principal crops. Rice production takes into accounts for 25% of the GDP. The per capita GDP is 1416 United States Dollar [USD] and Myanmar is lower middle income country. (World Economic Outlook, 2015) But the country has substantial human resources and economic potential as she has important geo-politic. Myanmar changes recently to open and democratic evolution.

Chin State is most western part of Myanmar. Total population is 478,690 that is 1% of Myanmar population (Department of Population, 2015). The area is 36,019 sq. km that is 5.23% of Myanmar area. Climate is mild hot and wet. April and May are the hottest months of the year. Monthly average temperature ranges from 15.5°C to 21°C. Average temperature in the cold season is 4.4°C. Chin state is divided by 3 districts into 9 townships which are made up of 505 village tract and quarters. Village has minimum 7 households to maximum 800 households. Most population in northern part of Chin State is Christian and in southern part is Buddhism. In Chin State, there are 6 major ethnic groups namely, Asho, Zo, Khumi, Laimi, Mizo and Zoomi. Rice and Corn are main staple food and there are food security states in annually 8 months per year. Diversification is very wide from one place to another ([MIID], 2014)

Paletwa is most western part of Chin State, 18 km leads to Bangladesh border. Population is 96,889. (Myanmar Parliament, 2014). In Paletwa, there are 27,555 ha of cultivated lands. The mainly practice of agriculture is upland or hillside cultivation showing 21,957 ha (80% of total cultivated land). Most of upland crops are Upland Paddy (6,613 ha), Sesame (829 ha), Galangal or Gamoan (550 ha) (*Kaempferia galangal*), Mustard Seed (444 ha.) and Turmeric or Na-nwing (306 ha) (*Curcuma Longa*). The other upland crops are Corn, Food Legume, Chili, Thetkae for roofing the house, Tobacco, Ginger and other vegetable crops. Orchard or perennial crops are Mango, Lime, Orange and Banana (Settlement and Land Record Department, Paletwa, Chin State, 2016).

“In Chin State, most of the farmers carry out slash-and-burn or shifting cultivation or (*taungya*) farming method. This method destroys fauna, flora, and soil resulting in denudation of cultivable slope and its environment. This makes many flowing streams dry up in summer” (Than, 2010). Some credit slash-and-burn farming methods with “destroying the forests of the country, causing soil erosion and depletion of fertility,” (Encyclopedia of the Nations, 2016). Therefore, this study will focus on the main practices of farming and will determine the factor analysis which affecting food security on upland agriculture households.

## Study Design

Target population is 220 households in Paletwa and sample size (n) is 141 households based on Taro Yamane for quantitative research approach. Among 100 quarters and villages of Paletwa, 1 quarter and 3 villages are selected. Random sampling is used for data collection.

In order to examine each household has food security or not, their food expenditure and the months the household worry about enough food is compared with food poverty line at the household level. “Food poverty is worse diet, worse access, worse health, higher percentage of income on food and less choice from a restricted range of foods. Above all food poverty is about less or almost no consumption of fruit & vegetables” (Food Access Network, 2016). Among the national food poverty line of previous research, Karosaki *et al.* (2004) informs the value of 200kg rice per year, (Kyaw, 2009) regard 215 Myanmar Kyat (MMK) /person/day and the finding of UNDP and Ministry of National Planning and Economic Development of Myanmar (MNPED) gives 324 MMK/person/day that is 0.34 USD. In 2016, there is 10.3 USD/person monthly and 124 USD/person yearly (Kyaw, 2009).

Logistic regression was developed by statistician David Cox in 1958. Logistic regression measures the relationship between the categorical dependent variable and one or more independent variables by estimating probabilities using a logistic function which is the cumulative logistic distribution (Walker, 1967). The logistic regression is here employed to observe the determinant of socio economic and demographic characteristics of the households on their food security in studied area. Food security status was assumed as a big value of one (1) and zero (0), whereas one (1) means food secure and (0) means food insecure. This model explains the probability or the possible determinant variable of household on food security condition. The applied variables are used according to previous researchers from different places: they are (Sekhampu, 2013), (Mwema, Mutai, Lagat, Kibet & Maina, 2012), (Thanh, & Yapwattanaphun, 2015) and (Oo, Iwai & Saenjan, 2013). The logistic regression equation is shown as follow:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \epsilon$$

Whereas  $Y$  is food secure status (if food secure, it is 1 and if food insecure, it is 0),  $\epsilon$  is the vector of variables and  $\beta_0$  is the dependent variables and  $\epsilon_i$  is the error term. The Socio-demographic information were used as following:  $\beta_1$  the age, (number of years)  $\beta_2$  education of household head (1 = no education, 2 = primary school, 3 = primary school, 4 = middle school, 5 = high school, 6 = higher education)  $\beta_3$  household size (number of family members in household) and  $\beta_4$  number of working people per household (number of people) and  $\beta_5$  non-farm income (amount of earning in

USD),  $\beta_6$  their own food production (percentage of own food production per their requirement, 1 = up to 20%, 2 = 21% to 40%, 3 = 41% to 60%, 4 = 61% to 80% and 5 = more than 80%) and  $\beta_7$  fresh fruit access (1 = always, 2 = often, 3 = sometime, 4 = rarely and 5 = never) .

Former researcher applied the variables age of household head, gender of household head and education attained by household head in his study of “Determination of the Factors affecting Food Security Status of Households in Bophelong, South Africa” (Sekhampu, 2013). With above researcher, indicated that education of household head and household size are resulting significantly in the paper of “Contribution of Selected Indigenous Fruit on Households Income and Food Security in Mwingi, Kenya” (Mwema *et al.*, 2012). Age of household head, formal education of farmer, the main income and second income or off-farm income, the property size are employed in the study of (Thanh, & Yapwattanaphun, 2015). To improve food security of their family in Northeast of Thailand, the variables: age, education, average household size, Average labour and average cultivated area are investigated by researchers. (Oo *et al.*, 2013) In sum up, the age, schooling years of household head or education of household head, household size, non-farm income, no. of working peoples, own food production and fresh fruit access are chosen for the variables in this study.

Among above 7 variables are expected to correlate with food security. If the household head have older age, he/she have more experience on farming and other income generation activities than the younger one that will result the positive determinant on food security. If the households head attained more education, he/she might know agriculture and technical knowledge as well as critical thinking and problem solving, therefore that family will be under food secure condition. Unlike previous two variables, the bigger household size might face food insecure as they have probably more children and elder. These variables are expected to determine negatively. The household size and no. of working people are different option here. Although more household's size is negative correlation, non-farm income may be positive. Almost all households depend on farming that is enough for food secure, the accessibility and amount of non-farm income may affect positively. The more they have working people, the more they secure food. It is predictable own food production and fresh fruit access are directly interrelated to food security in this study.

## RESULT

### The Demographic Information of Respondents

The data are analysed based on their response of the household. As shown in Table 1, the age of household head is 22 the youngest and 80 the oldest. The average age of respondents are 45 years old. Female household heads are 22 and the male 119 out of all household heads (n=141). The lowest education of household heads has not attained any education (no education and the highest is higher education. Generally, most of them are primary school education level. 72 households have got average primary school that is 51.1% of the whole population. Smallest household size is 2 and the largest one is 12. The mean of household size is 6. Every household has at least 1 working people and 6 is the most no. of working peoples. In every household, there are average 3 working peoples. Some households have no opportunity to earn non-farm income while some earn 2958 USD/year the most. The average non-farm income per household is 1263 USD/year. For their own food production, the lower group can produce up to 20% of their food requirement and the highest group 61% to 80%. The average production of household produce 21 to 40% of their requirement. Some of them never access fresh fruit and some always. In general, Fresh fruit are accessible sometime. Food expenditure is 210 USD/year the lowest and the highest 2880 USD/year. Average food expenditure per household is recorded 1164 USD/year.

Table 1. Minimum, Maximum, and Mean of demographic information of the households (2015-16) (n = 141)

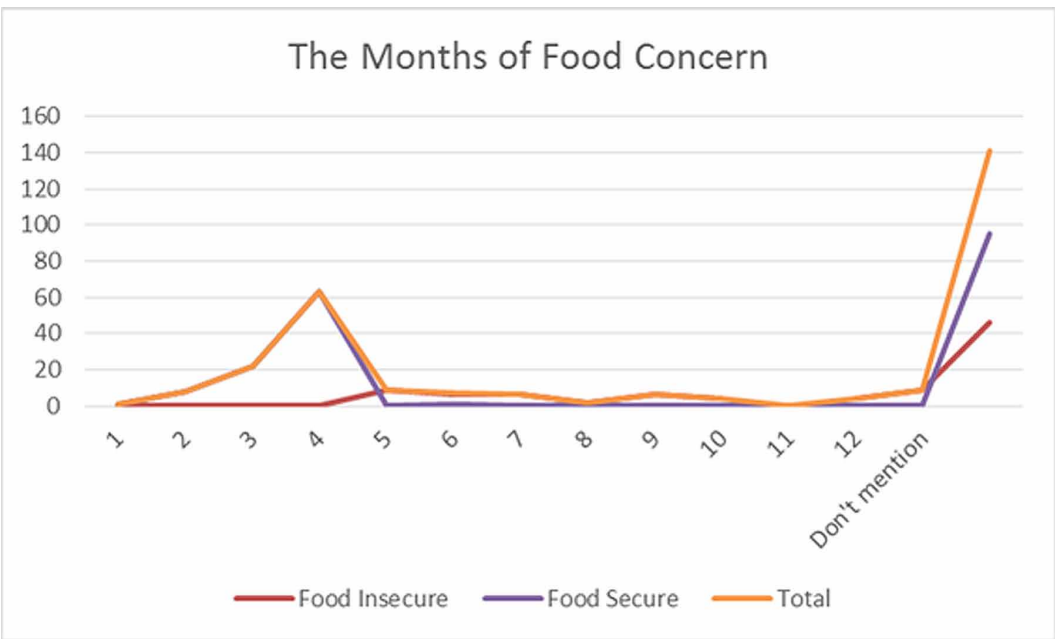
Variables	Minimum	Maximum	Mean	Std. Deviation
Age of HHH	22	80	45.33	10.808
Gender of HHH	1	2	1.16	.364
Education of HHH	1	6	3.13	1.152
HH Size	2	12	5.91	2.077
Number of working people	1	6	2.77	1.193
No-farm Income	0	2950	1262	693.88
Own Food Production	1	4	1.65	.765
Fresh Fruit Access	1	5	2.45	.865
HH Food Expenditure	210	2880	1164	569.96

### Food Security Status of Households

Food Security status is analysed by using comparison of food expenditure and national food poverty line and check the probability of food security with the length of time that the households' concern on enough food. National Food Security Line of Myanmar is 124 USD/person/year. Analysing food expenditure, 46 households (32.6%) are below the line and other 95 households (67.4%) are more than national poverty line. The food insecure condition mostly can be seen in 5- member households. Out of 30 households that holding 5 family members, 11 households are below food poverty line.

That 11 households are 24% of total food insecure 46 households and 37% of 5-memebr households. Examining their concern on enough food, 47 households (33.3%) worried about food

Figure 1. Food Security Status coping with the length of time (months) the households' concern on enough food



**Table 2. Food security status of sampling households according their food expenditure on income under national food poverty line during last year (2015-16) (n = 141)**

Comparison	Food Secure	Food Insecure	Households (n = 141)
Food Expenditure versus food poverty line	95	46	141
Percentage Food Secure and Insecure	67.4%	32.6%	100%

more than four months and other 94 households (66.7%) worried less than four months. 4 households concern enough food severely the whole years as shown in Figure 1.

Therefore, coping with food expenditure below national food poverty line and their concern on enough food, 46 household are food insecure and 95 households are food secure that resulting 32.6% has not gain food security and 67.4% has gained as shown in Table 2.

### Determinant of Food Security at Household Level

To determine what factors are influencing food security on upland agriculture households, 7 variables are analysed. Those are 4 Socio-demographic information and 3 food security indicators as shown in Table 3. The ages of household heads are one of the determinant of food security. They are correlated positively at the 5% significant level (p-value = 0.046). The household head become older, the food secure level of household will increase. Such as the household heads' age, the education they attained in their lives is related to food security status. The education of household heads shows the significant level 10% (p-value = 0.053) in positive way. The more the household head attained the education, the more the household food secure. Unlike the age and education of the household heads, the increasing family members in the household effect the food security condition reversely. With significant level 1% (p-value = 0.004) the household size and food security depend each other mutually. The capacity of working force is also main factor to secure food. No. of working person in one household is interconnected to food security situation. This variable show the signification 5% level with p-value 0.049. Among 4 Socio-demographic variables, 3 variables: age, education and no. working people in household, can determine the household level food security directly. Otherwise, household size gives reversal linkage to food security determination.

When other 3 food security indicators are observed, non-farm income and their own production are significant at 1% and 5% respectively. The 2 variables are scanned as positive factors affecting food security. These 2 indicators are tightly contingent each other. Food can be attained by the mean of production such as farming, raising the livestock, fishing and hunting as well as earning some non-farm income like labouring, migration work, serving as employee and some seasonal jobs. Non-farm income of 1% significant level (p-value = 0.002) point out their food requirement is not enough themselves although they absolutely rely on agriculture. Regardless of their purchasing power, the household ensure its food necessity if own food production has been reached to some extent. The significant confirm 5% with p-value 0.045. Fresh fruit access is not weighty here in this study. In the study area, the stable food is rice and some forest products like bamboo shoot and vegetables. The nutritious and commonly eatable fruit like mango, papaya, banana and coconut, etc. are not available too much in township. The handy fruits they are able to pick up or, and purchase are local fruit. Therefore, the fresh fruit are not determinant of food security in this limited study.

## DISCUSSION

Household size and non-farm income are most significant factors affecting food security. As there are more human resource in one households, earning income and employment opportunity is uncertain due to their lack of opportunities. The increase number of household members results in the decrease

**Table 3. Determinants of food security on upland agriculture households in Paletwa Township, Chin State of Myanmar (2015-16) (N = 141)**

Variables	B	S.E	Wald	Sig
Age of Household Head	.051	.026	3.998	.046**
Education of Household Head	.451	.233	3.747	.053*
Household Size	-.701	.242	8.410	.004***
No. of working people	1.154	.587	3.867	.049**
Non-Farm Income	.002	.001	9.769	.002***
Own Food Production	.782	.390	4.018	.045**
Fresh Fruit Access	-.384	.305	1.588	.208
Constant	1.195	1.742	2.876	.090

Source: Field Survey, Paletwa, Chin State, July 2016

Note: \*, \*\* and \*\*\* means coefficients significant at 10%, 5% and 1% respectively.

in food security. It is very difficult to maintain their food security status when the household size becomes bigger and bigger. This study contracted with other researcher (Sekhampu, 2013), (Babatunde, Omotesho & Sholotan, 2007) (Babatunde, Omotesho & Sholotan, 2007b), (Omonona, & Agoi, 2007), (Oluyole & Taiwo, 2015), (Bashir, Schilizzi & Pandit, 2012), (Zakari, Ying & Song, 2014), (Abu, & Soom, 2016) and (Arene & Anyaeji, 2010).

Result of analysis with logistic regression is seen that non-farm income is linked with food security positively at 1% level significance. Previous studies are some different that “off-farm activity is negatively related to food security” (Abu & Soom, 2016) and “food security is negatively affected by off-farm income” by Oluyole & Taiwo (2015) and Babatunde et al., (2007). The household cannot solely depend on farming, the access of other income source support the increasing status on food security. Although all household in this region are agro-based, their main food production and income from farm work is not enough for their families. Therefore, non-farm income like daily-labour, collecting forest product, serving the working in nearby Indian Harbour Project in Plaetwa is very important for them.

The age of household heads can determine food security positively with 5% significant level. While the household heads become older and older, he or she have gained a lot of experience to find food and money for his or her beloved food. Sekhampu, 2013 approves this finding and mention in the paper “the age of household head was positively associated with food security the coefficient for age (B = -.678) was positive and significant at 1%”. This study agreed the former researcher, (Arene & Anyaeji, 2010), (Zakari & Song, 2014) and (Babatunde et al., 2007b) express their conclusion that the increase age of household head had a positive effect on food security status. However, other previous research including (Babatunde et al., 2007) and (Babatunde et al., 2007b) show also the age of household head and food security is negatively correlated in study of (Bashir, Schilizzi & Pandit, 2012) in Pakistan, and (Omonona & Agoi, 2007) in Nigeria, (Oluyole & Taiwo, 2015), (Kuwornu, Suleyman, & PK, 2013), (Abu & Soom, 2016) and (Bashir, Schilizzi & Pandit, 2012).

The increasing number of working people in household lift up of food security. The more they have the people who can work and possible to earn income, the more they have more secure for food. Positive relation of number of working people go with Bashir et al. (2012) that use as the total earning household members (TEHH).

Own food production drive the food security situation in positive way. The result of this study is consistent with (Kuwornu et al., 2013), (Babatunde et al., 2007) and (Ojogho, 2010). The food security is determined by education of household in so many different ways positively. Bashir, et

al. (2012) proved the information of significance of education of household head while (Sekhampu, 2013) study is not significant.

## CONCLUSION

This study cover only 3 villages and 1 quarter in Paletwa Townships out of 100 village's tracts, and it is very limited to study most of food security indicators, therefore it is impossible to represent all population. Further afford to employ research able to scope all population should be tried. Extension of this limited study may be the few step and guiding star for the ambitious researcher and scholar who have desire to end poverty with zero hunger by the name of sustainable development goals.

The age and education of household heads, household size, no. of working people, non-farm income and own food production are observed as the determinant of food security with the analysis of logistic regression in this study.

When the age and education of household heads increase, the food security level increase. The older households have become more experience on farming and to sustain his or her household food security. It is clear that the household heads learn everything through time. Every household heads should be given the opportunity to gain experience and knowledge like as Farmer Field School (FFS) or agricultural extension services. Everybody in that area should be encouraged to study more and to extend their formal education as well as the households heads should be extended their informal and non-formal education to attain easier secure food in their whole life. The increasing number of household is driving their food insecurity condition. This means when their family become bigger and bigger they cannot control their food security status. They are lacking income generation activities or ideas. This factor is directly related with number of working peoples and non-farm income. As greater number of above two factors can save food security condition, government and some humanitarian group should promote the livelihood activities and income generation activities. Their food production is relatively low and it effects directly on food security and also it is cause of lower level of education and their lesser chance to upgrade their faming system. Government ought to give service of agriculture extension and some remarkable loan based on their need and ought to provide provision of inputs like good quality seed, fertilizers, pest and insect management as well as some agricultures implements and materials.

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