

Chapter 4

Empirical Results

4.1 Calculations of Food Poverty Line and overall Poverty Lines by means of the Cost of Basic Needs method

The Food Poverty Line is defined as the amount of money required to purchase the minimum food requirements of the each adult male equivalent in a given household. In the case study of the Nargis affected areas, the food poverty line estimated by the Cost of Basic Needs method refers to the subsistence minimum food energy requirement of 2100 calories per person per day plus other essential goods (FOSTER et al., 1984; Ravallion, 1998). The Cost of Basic Needs method was applied in constructing the poverty line for the two Nargis affected areas. The lowest quartile's food consumption was used as a reference for food consumption in order to avoid the underestimation of poverty. Using the FAO calorie conversion table from 1985, each food quantity was converted and then scaled up by 1.13 to reach the recommended intake of 2100 kcal per person per day. The food poverty line was estimated at 920 Kyats per person per day by multiplying the food quantities by average food prices. The population of the research area relies principally upon rice to get their required energy. They take less in other food items. They prefer to eat fish, which are produced and readily available in the study area.

Table 4.1 Calculation of Food Composition and Food Poverty Lines

Food Composition and Respective Food Poverty Line in the Study Area					
Items	Food Quantities of Ref. Household x 1.13 (gm/person/day)	Received Average Calorie (kcl/person/day)	Average Food Expenditure (Kyat/person/day)	Calorie Contribution	
				From Survey	FAO Recommended
Rice	482	1701	200	81	45
Cooking Oil	40	3	100	0.1	10
Meat and Fish	50	120	100	6.7	20
Eggs	0.05	3	100	0.1	n.a
Pulses	50	74	100	2.6	5
Vegetables	185	50	100	2.4	5
Spices	59	32	40	1.5	n.a
Sugar	25	86	30	4.1	n.a
Beverage	4.32	12	100	0.6	n.a
Other foods	17	19	50	0.9	15
Total		2100	920	100	100

Source: Adapted and Modified from Gender and Rural Poverty in Myanmar and field survey August, 2010

After estimating the poverty line, the non food poverty line can be estimated as follows:

$$\text{Non Food Poverty Line} = \text{Food Poverty Line} (1 - \alpha).$$

Therefore, Non Food Poverty Line = 920 Kyats (1 - 0.81) = 174.8 Kyats \approx 175 Kyats. Hence, the absolute poverty line is 920 + 175 = 1095 Kyats. The market exchange rate was 995 Kyats per 1 US\$ when survey was conducted. At the time of writing, in January 2011, the market exchange rate is now 850 Kyats per 1 US\$. That poverty line is converted to US\$ in current price in 2010, it is equal to US\$ 1.1. This value is very close the commonly used international standard of 1.25 \$ per day.

The total number of resident adult male equivalents for basic needs or workforce calculation is as follows: (boy 0-7 = 0, girl 0-7 = 0, male 8-12 = 0.3, female 8-12 = 0.3, male = 13-15 = 0.5, male 16-17 = 0.9, female 16-17 = 0.9, men 17-60 = men 17-60 = 1, female over 60 = 0.6, males over 60 = 0.75). The food poverty comparisons for the two areas showed that headcount poverty rate of heavily affected area is higher than the slightly affected area. Crop yields are affected by climatic conditions, usage of quality seeds with the correct ratios of organic and chemical fertilizers, soil fertility level, production technology, and pest and disease incidence. Farmers of the Irrawaddy Delta already lack of quality of seeds, types of chemical fertilizer and production technology. In addition, in 2009- 2010, the farmers faced crop failure because of late rain fall, heavy rain and pest and disease incidence. Among Nargis affected areas, the heavily affected areas were likely to face more pests and crop diseases than slightly affected area.

The 920 Kyats poverty line is applicable for the Irrawaddy Delta area, as a household in rural area faces relatively modest food prices. The researcher used the food poverty line for the calculation of the incidence, depth, intensity and urgency of poverty. Even with these caveats, there is clear destination between the two study areas in terms of the degree and severity of poverty.

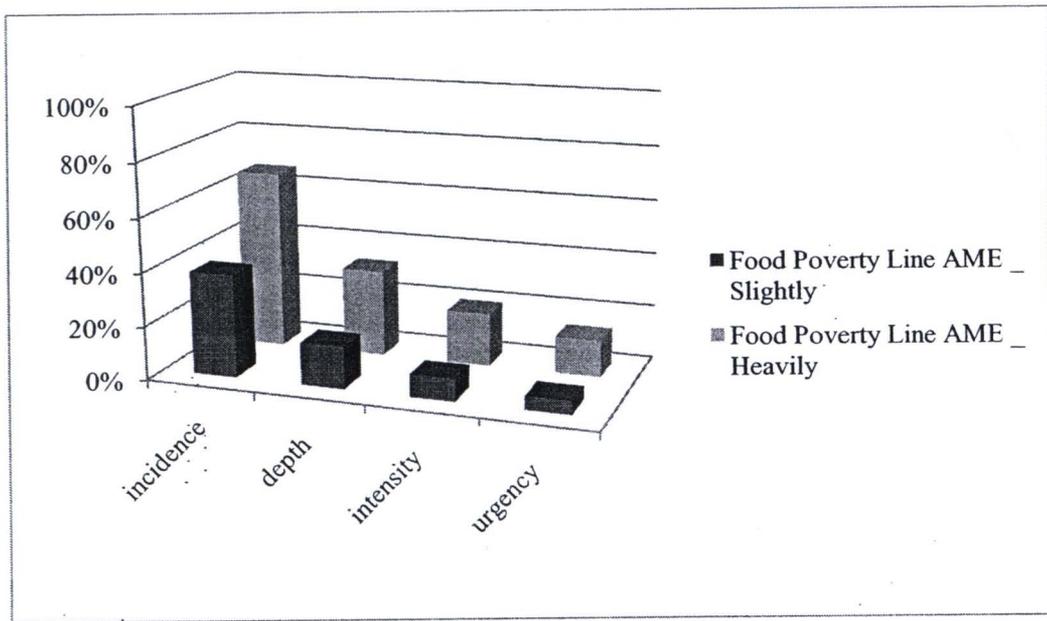


Figure 4.1 Food Poverty Ratio for the Two Nargis Affected Areas
 AME= Adult Male Equivalent ratio

We therefore “accept” (fail to reject) hypothesis 1, to the effect that “Current levels of net farm income and self-produced income in kind are adequate to supply 2100 calories and 95 grams of protein per day per adult equivalent to the majority of small scale farmers only in the slightly, but not heavily, affected areas of the Irrawaddy Delta.” A full 67% of the population in heavily affected Bogalay is food poor, while “only” 39% in slightly affected Pyapon lack adequate money to purchase sufficient food. Importantly, the depth and intensity of poverty are substantially higher in the heavily-affected area.

We must however reject hypothesis number 2, which states that “Absolute poverty is the same in both areas, but the depth, intensity, and urgency of poverty are significantly higher in the heavily Nargis affected area.” In fact, all Foster_Greer_Thorbecke-Schoch measures of poverty (incidence, depth, intensity and

urgency) are far worse in the heavily affected area, Bogalay than in the slightly affected area, Pyapon.

4.2 Relative Poverty of the Two Nargis Affected Areas

Turning now to relative rather than absolute poverty, the Lorenz curve of the net income per capita point to greater inequality of income in the heavily affected area, Bogalay. Still there is a very little difference in the Lorenz curves of net income per capita. The result is confirmed by the calculation of Gini coefficients, which show that the heavily affected area has higher inequality in income. The Gini coefficient of Pyapon Township, the slightly affected area, is 0.4 and Gini coefficient of Bogalay Township, the heavily affected area, is 0.45. This signifies that Bogalay has a somewhat more intense level of income inequality. The Theil Index of the slightly affected area, Pyapon is, however much lower (0.25) than that of the heavily affected area, Bogalay (0.38).

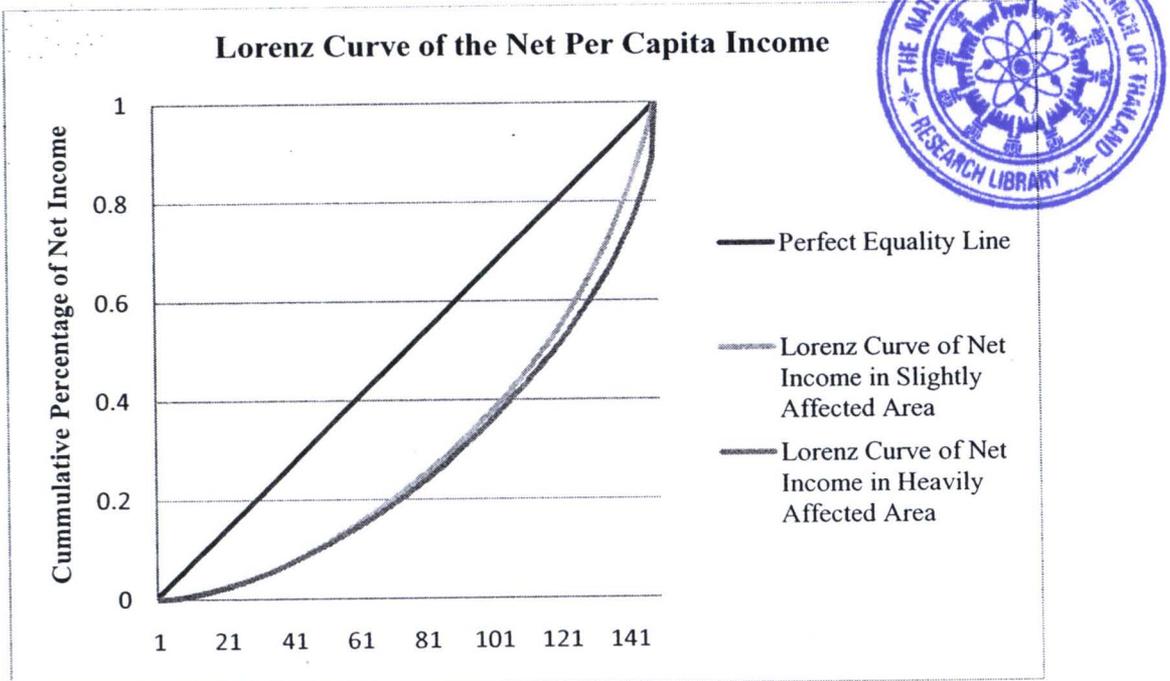


Figure 4.2 Comparative Lorenz Curve of the Net Income Per Capita

Figure (4.2) shows that the Lorenz curve of the income in both areas is almost the same at the origin thus illustrating that the income distribution among the poor is virtually the same in both areas. At the higher income level classes, however, the Lorenz curve of heavily affected area, Bogalay is steeper than the slightly affected area, Pyapon. This isolates the greater inequality in Bogalay at the upper end of the curve, suggesting that certain favored households were helped more by relief efforts in the heavily affected area.

We therefore fail to reject the hypothesis number 3, which states that “Relative poverty (as measured by Gini and Theil indices) is higher in the Nargis heavily affected area”. Both the Gini and Theil measures of inequality are significantly higher in the heavily affected area, Bogalay. Table (4.2) summarizes the various measures of absolute and relative poverty for the two study areas.

Table 4.2 Levels of relative and absolute poverty in the two study areas

Nargis Areas	Slightly Affected Area (Pyapon)	Heavily Affected Area (Bogalay)
Gini	0.40	0.45
Theil Index	0.25	0.38
Incidence	39%	67%
Depth	16%	32%
Intensity	8%	20%
Urgency	5%	17%

4.3 Constraints in Farming

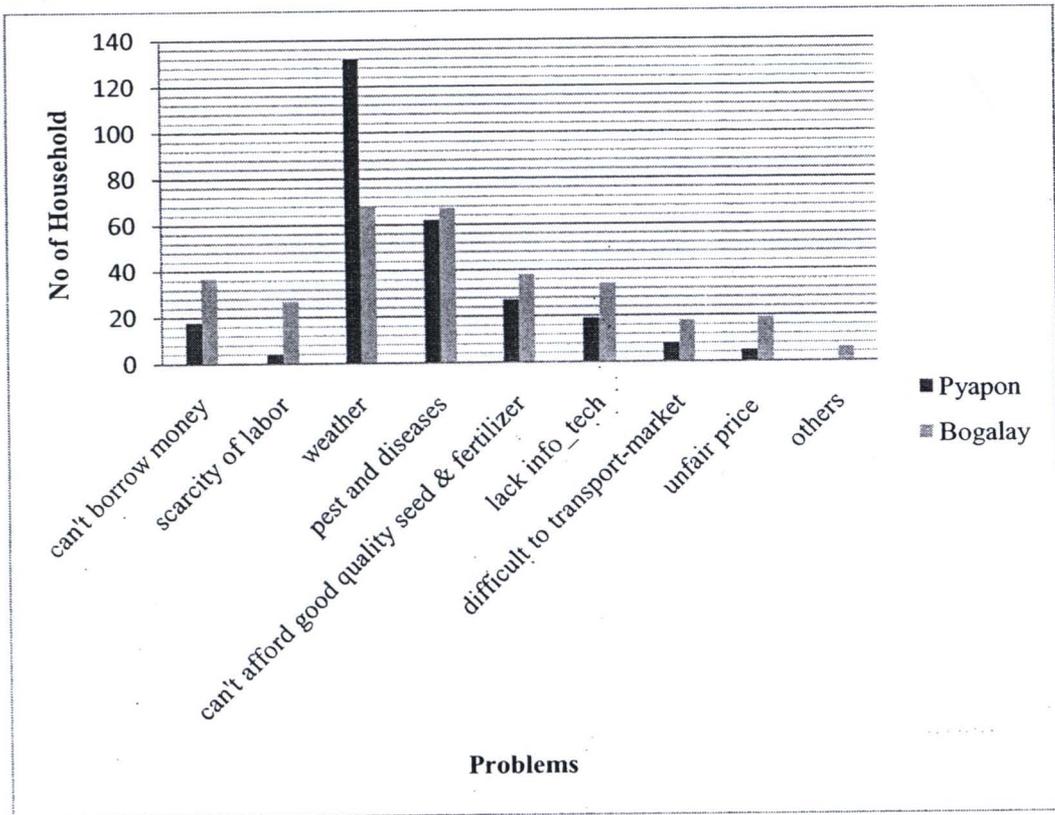


Figure 4.3 Constraints in Farming

Out of the 298 households surveyed, 290 households faced constraints in farming. Households were asked to list their main constraint or obstacle to farming. Figure (4.3) shows the types of constraints in farming from the two study areas. Households faced difficulties with weather and pest more than others constraints after Nargis. The heavily affected, Bogalay area is facing more difficulties than slightly affected area.

4.4 t- Test between Per Capita Income and Constraints in Farming

Table 4.3 t- test between per capita income and constraints in farming

Variables	Naris affected statuses	N	Mean	Std. Deviation	F	Sig.	t	Sig. (2-tailed)	Mean Difference
pc_sales_lvstk	heavily	150	.0228	.084	15.017	.000	1.994	.047	.0152315
	slightly	148	.0076	.040					
pc_sales_vend	heavily	150	.0061	.043	14.107	.000	2.051	.042	-1.765E-02
	slightly	148	.024	.095					
total gross income per capita	heavily	150	389784.52	262029.26	3.357	.068	2.876	.004	81546.80
	slightly	148	308237.73	226336.10					
Can't borrow money	heavily	150	.25	.433	33.953	.000	2.815	.005	.125
	slightly	148	.12	.328					
scarcity of labor	heavily	150	.18	.385	103.408	.000	4.473	.000	.153
	slightly	148	.03	.163					
weather	heavily	150	.45	.499	222.418	.000	9.107	.000	-.439
	slightly	148	.89	.312					
lack info_tech	heavily	150	.23	.420	20.842	.000	2.233	.026	.098
	slightly	148	.13	.336					
difficult transport-market	heavily	150	.12	.326	16.942	.000	2.013	.045	.066
	slightly	147	.05	.228					
farming_unfair price	heavily	150	.00	.000 ^a	39.874	.000	2.991	.003	.093
	slightly	148	.00	.000 ^a					

Most of the households from the affected areas who earn income do so in the informal sectors. Although the informal sector is not precisely defined, it typically

consists of workers with poor education, little access to technology, few productive assets, and access to credit only with very high interest rates, and employment in the family farming business. Because of the lack of production capital in agriculture, the basic economic sector, a substantial part of farm household livelihoods comes directly from farming. If support for livelihood activities does not continue, there is a risk that many people will face severe hardship, especially given the failure in the harvest for 2010. Access to credit on reasonable terms or direct input of funding to help farmers replace lost assets remains a major requirement. As yet, there is no indication that the government will step in to resolve this issue. The independent sample student t-test was used to test for the differences between slightly affected Pyapon and heavily affected area Bogalay in terms of the constraints in farming (Table 4.3). The livelihood situation after Nargis was expected to be different and socio-economic variables were supposed to be similar.

The basic demographics of the two areas – age of the household heads, schooling years of household heads, household sizes – are not significantly different. However, the relative ranking of the most limiting constraints in the heavily affected area is significantly different from those in the slightly affected area. According to the t-tests, percentage of income from livestock, percentage of income from vending, total gross income per capita and borrowing money, labor, weather, lack of information technology, difficulty to transport to market and unfair price for constraints in farming are significantly different between two areas. Livelihood is the secondary occupation for these two areas and the percentage sales of income from heavily affected area is high and also exhibits a variance. The constraints in farming for borrowing money, finding laborers, acquiring information technology, and managing transport to market

are significantly higher in heavily affected area, Bogalay. The availability of credit for food, health and business are significantly higher in heavily affected area, Bogalay. That is why the people from heavily affected area likely to face difficulties to face with food sufficiency.

4.5 Sources of Credit

Table 4.4 t- test between sources of credit

Variables	Nargis affected status	N	Mean	Std. Deviation	F	Sig.	var	Sig. (2-tailed) means	Mean Difference
Source of credit for food and drink	heavily	27	2.85	1.433	14.758	.000	-1.947	.058	-.694
	slightly	22	3.55	1.057					
Source of credit for health care and medicine	heavily	25	3.32	1.249	83.199	.000	-2.806	.010	-.704
	slightly	41	4.02	.156					
Source of credit for business	heavily	128	3.54	1.034	26.952	.000	-2.576	.011	-.290
	slightly	117	3.83	.711					

Taken together, the above empirical results do not lead us to reject hypothesis 4, which stated that “The principle constraints facing agricultural households in slightly affected Pyapon are those of weather, whereas in heavily affected Bogalay they are economic in nature.”

4.6 Determinants of Income

Income per capita is highly correlated with the acres of farm land and negatively correlated with household size, as farming is unproductive (Table 4.5). The

higher the number of family members in the household, the lower will be the net income per capita. Furthermore, the number of boys who are studying is negatively correlated to the net income per capita income. Boys are considered to be more productive than girl for farming and casual labor. If they are not studying, they can work for the family.

Table 4.5 Regression of net incomes per capita on socio economy

Net Income per Capita	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Arable land available for each household member	174016.700	23309.213	.600	7.466	.000***
Employment Rate	117760.487	65605.650	.177	1.795	.074
Age of household head	-2928.145	949.869	-.395	-3.083	.002***
%income from live stocks	1000107.496	208349.293	.195	4.800	.000***
%income from casual labor	191966.290	115180.065	.074	1.667	.097
Nargis affected status	12208.145	27311.099	.025	.447	.655
Average score across physical, mental, emotional, and spiritual happiness	27686.267	16799.979	.250	1.648	.100

Adjusted R square= 0.553

F=53.427

The percentage of sales income from livestock and casual labor is also highly correlated to the net per capita income because when the farming is unproductive, the

livestock, fishing and casual labor are very important source of income for them. Fishing has many constraints especially since the capital needed to start this livelihood activity is high. So, for low income small farmers, their secondary income depends on livestock and casual labor. Finally, the average score across physical, mental, emotional, social and spiritual happiness is positively and highly correlated with net capita income. (The calculation of this variable will be fully explained in the next chapter). People who are happy and healthy in all dimensions of their lives will work with greater efficiency and productivity, thus generating higher income.

The total gross income per capita is also significantly different for these two areas. However, both the mean and the standard deviation of total income per capita of the heavily affected area is higher than the slightly affected area. This explains why the economic inequality and the percentage of people below the food poverty line are significantly higher in the heavily affected area, Bogalay. Livestock is a good source of income because most of the livestock from heavily affected areas were killed by Nargis. The percentage of income from vendors is significantly higher in slightly affected area. The household from the slightly affected area have shifted their livelihood to the economic activities from farming when they lost their productive assets during cyclone. We therefore cannot reject hypothesis 5, to the effect that “The relative share of various sources of income has changed significantly for the Nargis heavily affected areas as compared to the slightly affected area.”

4.7 The Intensity of Food Poverty

Living in the strongly affected area, Bogalay, as well as other factors (Table 4.6) strongly determine the intensity of food poverty. For example, the household size

is strongly significant. The higher the household size, the higher the intensity of food poverty. The intensity of food poverty is also correlated with the adult male equivalent ratio. Acres of farm land are one of the prominent factors influencing the intensity of food poverty. The more they own the land for farming, the lower the probability of food insufficiency. As the research focuses on the agriculture of small farmers, the intensity of food poverty is directly and highly correlated with the lack of arable land.

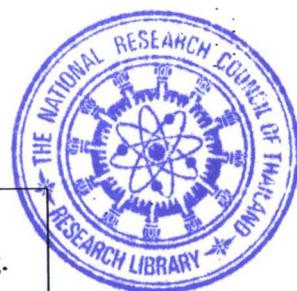
Table 4.6 Regression to explain the intensity of food poverty

Intensity of Food Poverty	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Acres of Farm Land	-.056	.009	-.749	-6.025	.000
Household Size	.039	.008	.680	4.643	.000
Age of household head	.002	.001	.373	2.615	.009
%Income from casual jobs	-.314	.103	-.159	-3.055	.002
Level of education of any household member	-.011	.004	-.331	-2.661	.008
Dependency Ratio	.025	.010	.195	2.536	.012
Total No of Job jobs in HH	-.055	.019	-.383	-2.908	.004
Total number of problems in farming	-.018	.008	-.162	-2.240	.026
Nargis affected status	.059	.023	.158	2.530	.012

Adjusted R square = 0.460

F= 26.258

We therefore cannot reject hypothesis 6, which states that “The intensity of food poverty significantly increases with household size, total number of problems in



farming, dependency ratio, age of household head, and the intensity of Nargis damage; and the decreases with acres of farmland, total number of jobs in the household and highest education of any household member.”

But we must reject hypothesis 7, which states that “The negative determinants of the intensity of food poverty are the simple mirror image of the positive determinants of income per capita.” Simple visual inspection of Tables (4.5) and (4.6) reveals little parallelism between the significant determinants of income and poverty intensity. More specifically, although five variables (household size, acres of farm land, total number of jobs in household, level of education of household head and income from casual work) are common to the two equations, each has to add other variable to compare their explanation value. These are total numbers of problem in farming, dependency ratio, income from livestock and average score of five Chiang Mai Happiness Level.

As farming is unproductive both in terms of providing food and incomes to households, respondents were asked about the source of food consumed for the current month of the study, August 2010. The most common means by which households sourced food for household consumption was,

- 1) Own production – 43%
- 2) Purchase – 39%
- 3) Pre-harvest advance - 8%
- 4) Borrow Money- 6%
- 5) Work for meal – 3%
- 6) Gift from family – 1%

These percentages are for the two areas together. The pie chart for two areas presented how residents of each area managed their food source in August 2010.

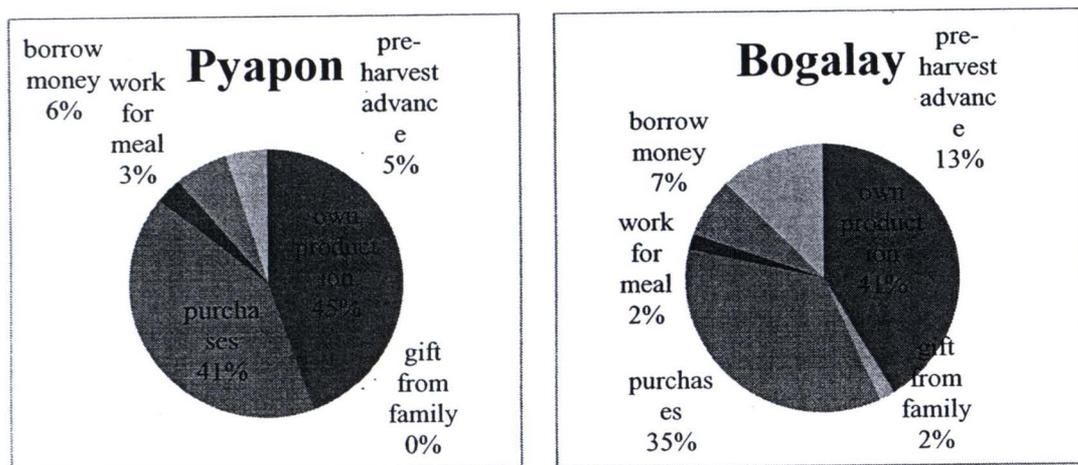


Figure 4.4 Food sources in the slightly and heavily affected areas, respectively

The nearly forty percent of the sample relies upon purchase, with nearly half of the households unable to meet their needs from cultivation, dramatically underscores the fact that agriculture is unproductive. Across the sample it was seen that most of the households did not own any productive assets. Households were asked to list their sources of income with priority. As the targeted population of this study is farmers, the most common source is agriculture, with casual labor and fishing following in that order. Households typically generate income from a combination of activities. A combination of specific activities is utilized by households to meet one or more household priorities (e.g., food, income, access to services).

The greater the number of income-generating activities pursued by a household, the easier the ability of the household to cope with shocks and stress. Almost all family members are working in their farms and their productive work forces are undefined. Average household size is four and the average number of

people with jobs in the household is two, typically a combination of agriculture and casual labor or fishing.

To better understand household resource allocation, data on expenditure for food and such non food-items as education, health, education, business, interest and transportation were collected, the average household uses 35% of their income on business and 33% on food. So, however they invest in the business, the unproductive farming makes them sink deeper into the poverty circle. After food, the third most commonly reported expenditure was on interest from loans. Looking at the expenditure items per household, it is clear that almost all households in the sample having only one expenditure per month; food. Others expenditures such as business and interest are annually-based. Most of the residences in the area live in self-constructed housing. Most of the housing materials are from their orchards. Unlike in other areas of this research, the patterns in heavily- and slightly-affected areas are virtually identical (Figure 4.5).

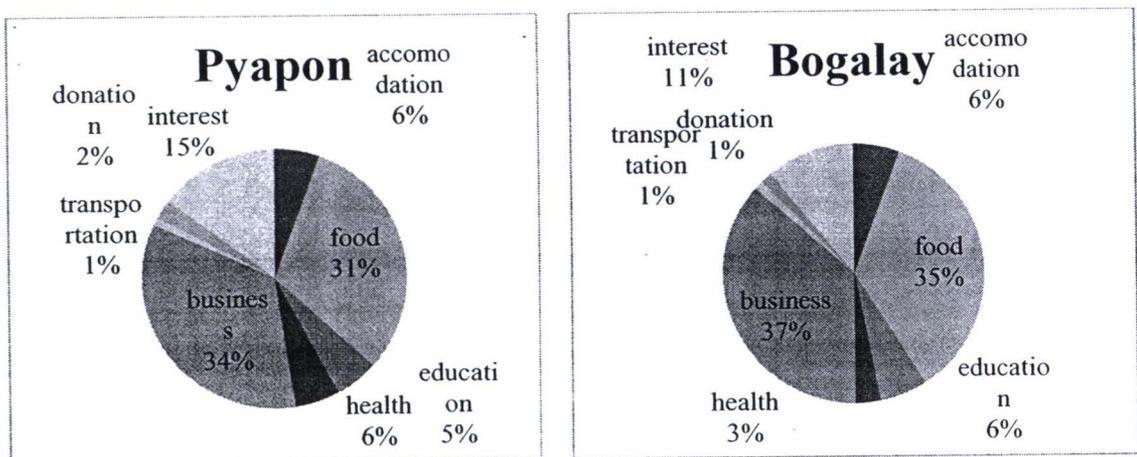


Figure 4.5 Expenditure shares in the slightly and heavily affected areas, respectively

As already stated, most of the households from the affected areas who earn income do so in the informal sectors. Although the informal sector is not precisely

defined, it typically consists of workers with poor education, technology, productive assets; credit with very high interest rates; and employment in the family farming business. Because of the lack of production capital needed in the agricultural sector, a substantial economic sector in Myanmar, a significant part of farm household livelihoods comes directly from agriculture.

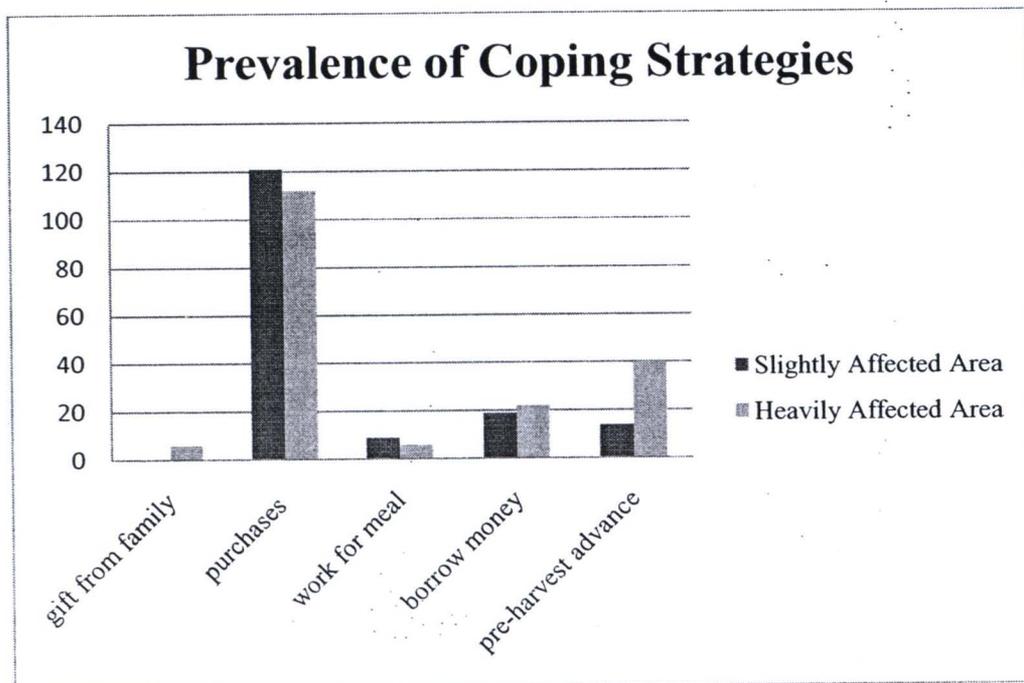


Figure 4.6 Prevalence of Coping Mechanisms

Respondents were asked to list any coping strategies that their households was forced to rely on to bring in sufficient food and the frequency of this reliance. The data on coping strategies clearly show that almost all of the sampled households resort to strategies of purchasing low quality food. Furthermore, the pre-harvest advance coping strategy in the households of the heavily-affected area is higher than in the slightly-affected area. As mentioned, the heavily-affected area faces food insufficiency more acutely than the slightly-affected area. Purchasing low quality food holds the highest risk to household food security. Eighty percent of households

reported reliance on this mechanism. This clearly indicates that most of the households are unable to source enough food or income to meet their food requirements from their production.

4.8 The Situation of Housing

As we are studying the well being of the Nargis affected area, poverty was approached by basic needs. How we approach and which dimension we approached are mentioned in chapter 3. For the housing conditions, we approached with the quality of shelter and variables are the materials which used in constructions.

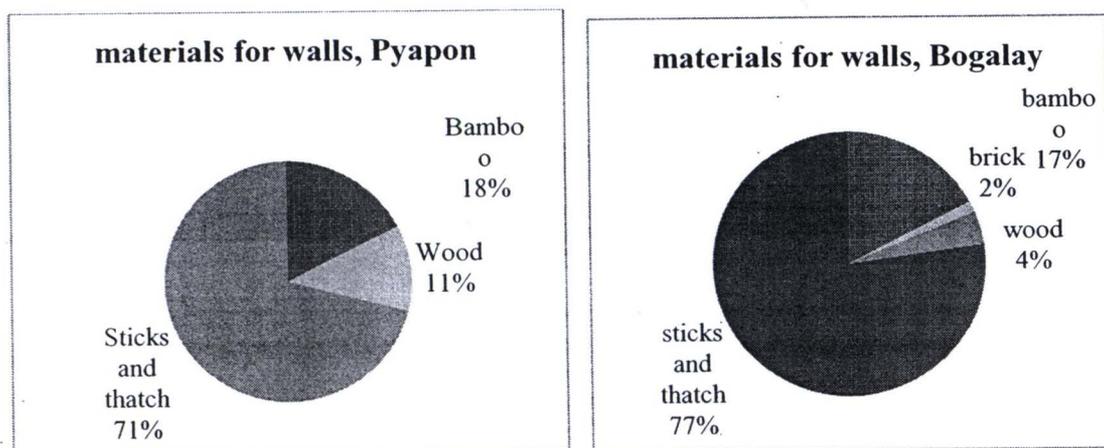


Figure 4.7 Materials for Walls in the Slightly and Heavily Affected Areas, respectively.

Housing facilities for both areas are not much different before and after Nargis. Almost all household use the sticks and thatch for their walls which can easily get from their land. Thatch is used for roofing. The people from both areas are using the local products for housing materials and the level of strength is unpredictable. They are facing that weather for long time and this Nargis was the very first and the

worst in their life. So, they could not afford for the very strong dwelling and familiar with the sticks and thatch house. However, they had been lost many lives and properties and destroyed all; they rebuild their house like before Nargis for both areas. You can see clearly in the figure (5.3) and (5.4).

The floors are normally made of wood and raised above the ground. Almost all household own detached houses before and after Nargis for both areas; and most do not have a separate room for family members. They have built their house by themselves and on their own farm land.

Most of the small scale farmers who live in Nargis affected areas are forced to live in inadequate housing, because they have to devote virtually all of their income for food. This study confirmed that the housing conditions of many poor families living in private, unassisted housing and welfare assistance are significantly inadequate.

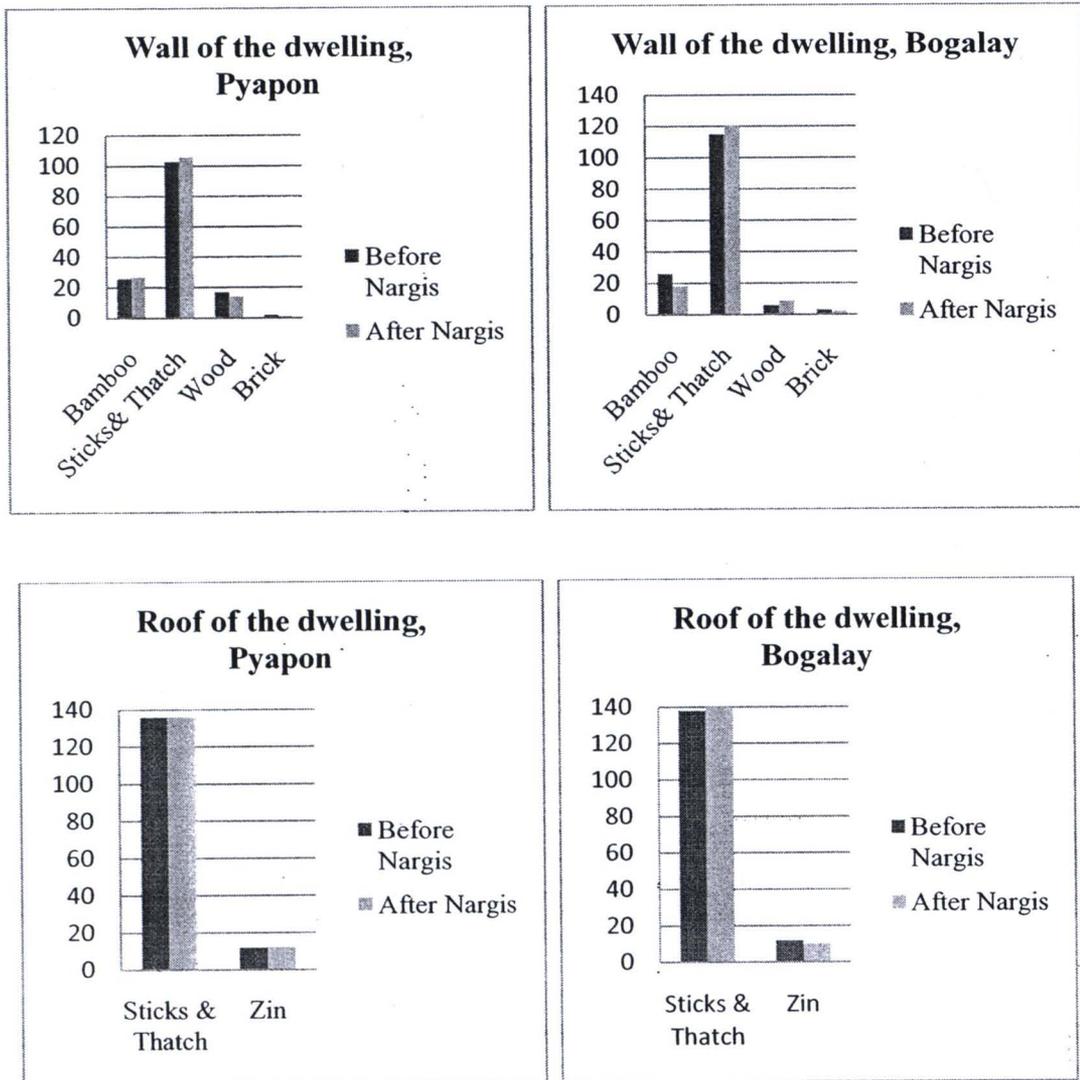


Figure 4.8 The Housing Materials for the Slightly and Heavily Affected Areas, respectively

Householders were asked whether, if they faced another cyclone like Nargis, they had a strong building or cyclone shelter for safety. Most of the households replied in the negative. They only have village monastery places to seek safety if anything happened. Only a small percentage of the people can go to the cyclone shelter.

4.9 The Situation of Sanitation

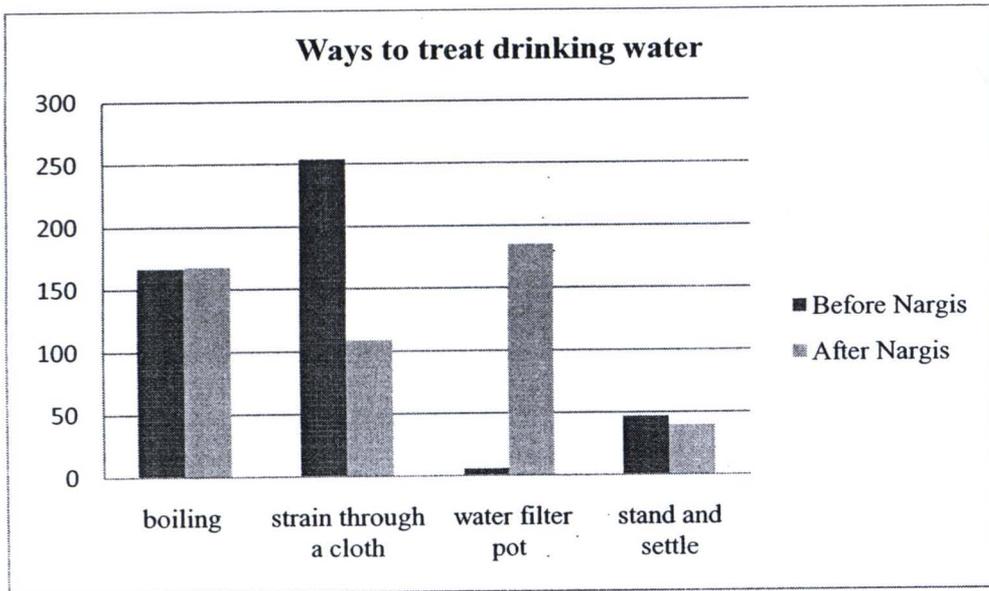


Figure 4.9 Ways to Treat Drinking Water Before and After Nargis

Households were asked about the source of their drinking water. A similar percentage of households in both areas obtained their water from not treated sources. Most of them drink rain water in rainy season and use pond for summer. Only a small minority of households are able to capture and retain rain water in anticipation of the summer. Average time to get water is around fifty minutes and at 2010 summer, both areas faced serious shortages of drinking water as the whole country faced unprecedented water shortage.

Households were also asked if they treated their drinking water. Almost every household treats their water to make it safe(r) to drink. Three-fourths of all households from those two areas used a cloth and strained the water before Nargis. But, after Nargis, some non government organizations have distributed water filter

pots and educated residents on the importance of clean water. Thus, in the post-Nargis period the treatment of drinking water is higher than ever.

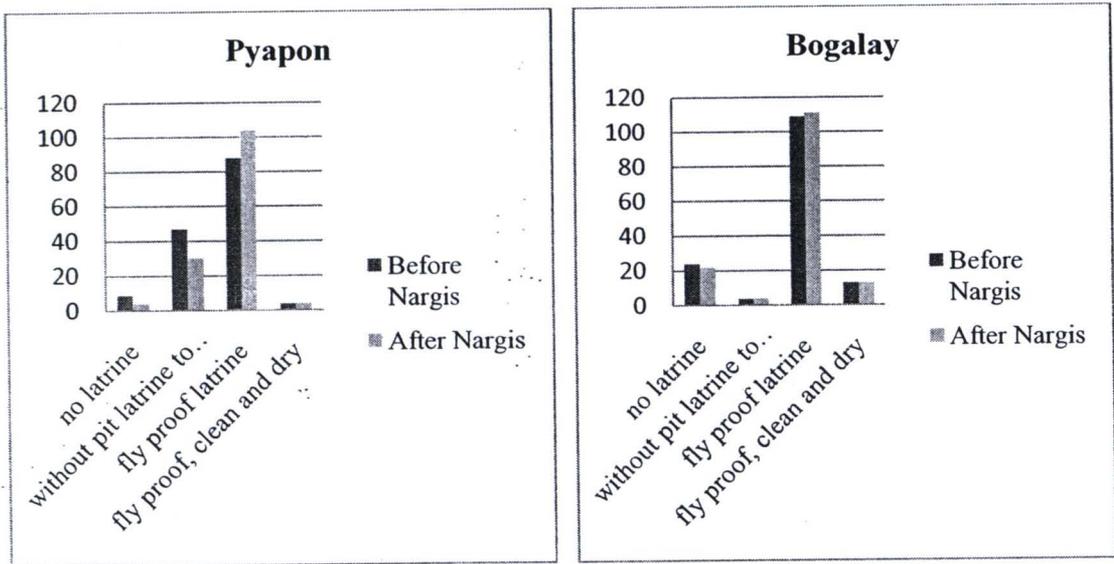


Figure 4.10 Latrine facility type in the slightly and heavily affected areas, respectively

In the slightly affected area, two-thirds of the households have fly-proof latrines. Comparing between before and after Nargis at Pyapon, the number of households who have no latrine has decreased. Because of education about water and sanitation given by non government organizations and agencies, the knowledge about sanitation has improved. Heavily affected Bogalay Township has more latrine households, but also more households with fly-proof, clean and dry latrines. It because of the education about sanitation and aids provided from the non government organizations. This lead us to reject hypothesis eight, "The levels of drinking water, sanitation, building construction, and other physical determinants of living standards are as high or higher in the heavily- than the slightly-affected areas."



4.10 Summary of the results presented in this chapter

The results of our hypothesis testing have confirmed that current levels of net farm income and self-produced income in kind are adequate to supply 2100 calories and 95 grams of protein per day per adult equivalent to the majority of small scale farmers only in the slightly, but not the heavily, affected areas of the Irrawaddy Delta. Relative poverty (as measured by the Gini and Theil indices) is significantly higher in the heavily Nargis affected area; as are all measures (incidence, depth, severity and urgency of absolute poverty). The relative share of various sources of income has changed significantly for the Nargis heavily-affected areas as compared to the slightly-affected area.

The principal constraint facing agricultural households in slightly affected Pyapon are those of weather, whereas in heavily-affected Bogalay they are economic in nature. Finally, the intensity of food poverty significantly increases with household size, total number of problems in farming, dependency ratio, age of household head, and the intensity of Nargis damage; and decreases with acres of farmland, total number of jobs in the household, level of education of any household member, and the average no. of meals per household member for a day in the past seven days.