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Impacts of Cyclone Nargis on Social Capital and Happiness in Slightly and Heavily Affected Areas of Myanmar

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Additional information is available at the end of the chapter

<http://dx.doi.org/10.5772/54140>

1. Introduction

Over the past twelve years, natural disasters such as floods, tornadoes, cyclones, volcanic eruptions, earthquakes, *tsunamis* and landslides have intensified, violently terminating thousands of lives and leading to vast financial and environmental losses. The magnitude of those losses depends upon the vulnerability of the affected population, which is in turn influenced by the country's poverty level, social safety nets, inter-group inequalities, educational system, infrastructure, other institutions or policies, and prevention technologies. Still, many types of disasters brush mockingly aside even the most ingenious technologies perfected by humans.

Multiple causes explain the increased frequency and destructiveness of such events. Human abuse of the earth's resources, unrestrained pollution, and the release of greenhouse gases may not actually cause natural disasters, but they have clearly made them worse and more frequent [1]. Destruction could be eased through short-term early warning systems and long-term poverty reduction programs. Human cultures, beliefs, social interactions and happiness are deeply affected by disasters and constitute a set of human resources that can be used to rebuild society afterwards. Only if the physical and emotional impacts, as well as the successful and unsuccessful prevention and mitigation strategies, of such disasters are better understood may societies hope to reduce suffering from future disasters.

1.2. Case study of cyclone Nargis

One of the least analyzed natural disasters of the past 20 years is the cyclone -- deceptively named *daffodil* (Nargis) -- that assailed the *Subjective Well-Being* (SWB) of small

scale farm families in the Irrawaddy Delta, Myanmar. On May 2, 2008, this cyclone ripped away the ability of those farmers to feed even themselves, much less others. They lost their families, means of livelihood, and property. Flooding, rains and storms surges washed out almost everything and left behind only barren land. The government stopped reporting the official death toll when it reached 138,000 people, but this is surely an underestimate; especially since the figure did not include the 55,000 people still missing at that time. Thus, Nargis victims in Myanmar easily surpassed the entire human loss (170,000 fatalities) suffered from the much better-known nine-country (Indonesia, Sri Lanka, India, Thailand, the Maldives, Somalia, Myanmar, Malaysia, Seychelles) tsunami of 2004 [2].

A significant portion of the Nargis deaths could probably have been avoided. No system or programs of disaster relief or prevention were in place in Myanmar at the time of the disaster. Indeed, Nargis is the epitome of what can and does go wrong when humans disregard the delicate balance between nature and human consumption patterns, fail to anticipate or prepare for the consequences, and refuse aid in the hours and days following the disaster. It is true that throughout Myanmar, the involvement of government, non-governmental and economic development organizations in disaster recovery brought a certain level of needed support to the victims. Some organizations dedicated entire programs to disaster-related issues, whereas others administered recovery funding to only a limited extent. Unfortunately, however, each aiding country or organization brought its separate capacity and solutions, leading to coordination gaps and overlaps. Some international relief organizations even imposed conditions, such as religious conversion, which put victims into a no-win situation. Worse still, the government turned away or lethally delayed much of the shipments of food and medicine sent to the country [3].

1.3. Goal and specific objectives of the case study

The present study attempts to measure the subjective, intangible impacts of the Nargis cyclone on the happiness and well-being of the inhabitants of the Delta. The overall goal is thus to infer, using two study areas differentially affected by Nargis, its impacts on the level and distribution of *SWB* and social capital, and to make policy recommendations for the alleviation of some of the psychic effects. We used the word *infer* rather than *measure* because there had been no baseline study of subjective (or even monetary) well-being of the heavily affected area, Bogolay, before Nargis struck. A slightly affected area, Pyapon, was selected as a proxy benchmark for the *before* situation in Bogolay, against which the *after* situation, 27 months following Nargis, might be compared. To achieve this overall goal, this chapter is designed to meet four specific objectives:

1. Assess and compare relative poverty vs. relative happiness using the Gini, Thiel, and Lorenz curves [4], [5] for small farm households in heavily- vs. slightly-affected areas.
2. Assess and compare absolute poverty vs. absolute happiness using the Foster-Greer-Thorbecke indices [6] for small farm households in heavily- vs. slightly affected areas.

3. Identify the physical, mental, emotional, social, and spiritual causes of subjective ill-being in areas differentially affected by Nargis.
4. Advance recommendations to local and national governments, NGOs, disaster researchers, and the affected communities concerning how to reduce absolute unhappiness; and anticipate, protect against, and reduce the psychological and social impacts of natural disasters.

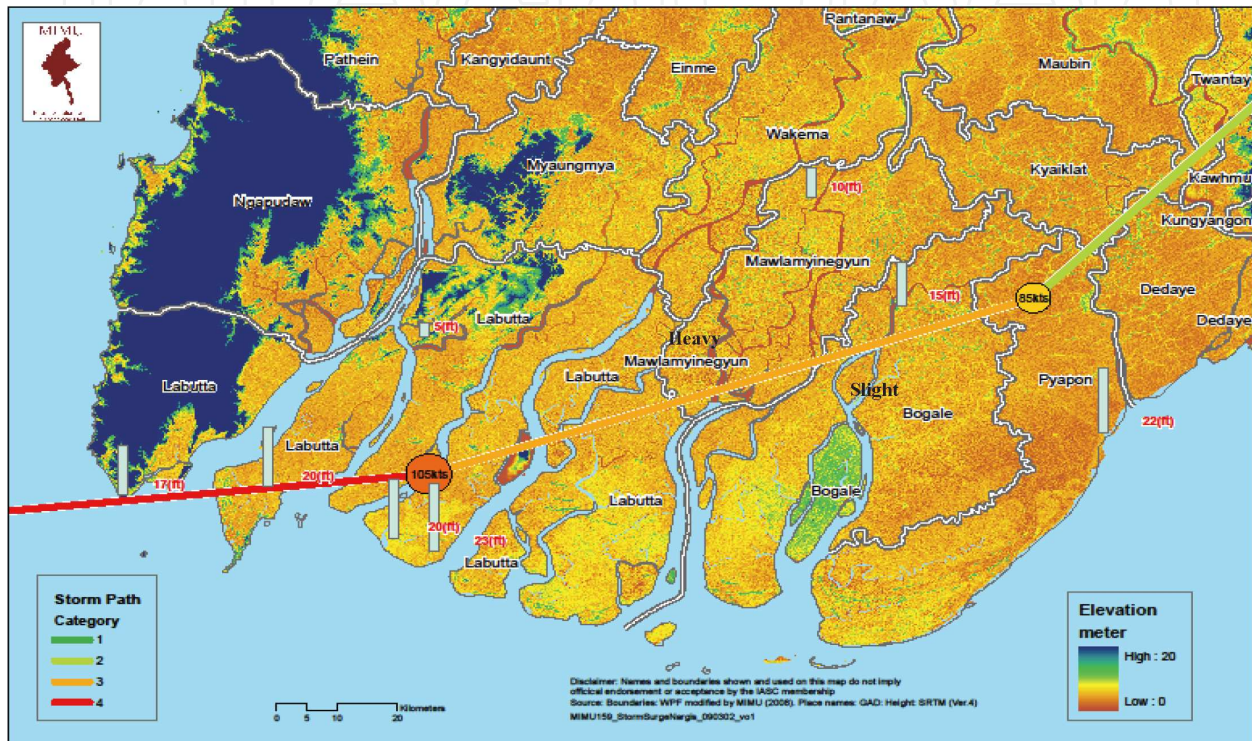


Figure 1. Path of cyclone Nargis and the loctions of the heavily and slightly affected areas. Source: MIMU _ Myanmar Information Management Unit

2. Literature review

The socio-economic research on natural disasters and their human consequences is fairly limited. Studies carried out among direct victims of disasters have demonstrated the persistence of at least one third of cases of trauma for more than two years after disaster exposure [7]. According to Galea et al. [8], most post disaster trauma will likely be resolved. Long term trauma on disasters continues to remain largely unexplored. Generally, post disaster stress subsides within one or two years in comparison to the immediate post-disaster situation.

To alleviate such trauma, Das [9] finds that the creation of a public space for sufferers may achieve to share voices for recounting their experience and a social acknowledgement of the

events they have survived. Healing can be the end of suffering based on the way people use right understanding and life wisdom to interpret those events. The themes of wholeness and spirituality are harmonized with the origin of the term healing. Healing may be achieved through cognitive, emotional or behavioral reactions.

The individual stresses of a disaster have been found to be influenced by social networks. Disaster recovery is not only about building houses but the reconstruction of the whole community as a safer place [10]. To mobilize each member of the community in this community development, social capital is a crucial need. Indeed, in the post disaster situation the maintenance or increase of social capital seems crucial to enhanced disaster resilience. Social factors play a big role in the prevention of Post-Disaster Psychological Distress because of the strong correlation between the presence of social support and the mental health outcome following traumatic events.

Adler and Kwon [11] believe that social capital research is guided by the intuition that the goodwill borne to us by others is a valuable resource. They define social capital as the goodwill available to individuals or social groups. Its source lies in the structure and content of the actor's relations. Its effects flow from the information, influence, and solidarity made available to the actor. Dekker and Uslaner [12] label external or out-group social capital as bridging [13] or communal social capital [14], while that focused on internal relations may be termed *bonding* or *linking*. Noy [15] has determined that countries with higher social capital, educational attainment, quality of institutions and governance, government spending and per capita income are better able to withstand the initial disaster shock and prevent further spillovers into the macro-economy. It is worth noting that Myanmar is lacking in most of these dimensions.

Social capital in turn is found to be positively correlated with subjective happiness since it provides support and opportunities for sharing at the individual level. Frey [16] explains that such trust and honesty improve social outcomes by increasing the levels of per capita income and SWB. If the people with whom one deals can be trusted rather than doubted, social capital is generally higher. Trustworthiness has both individual and societal dimensions; those who live in societies with high levels of trust are likely to have higher well-being, irrespective of individual views about trust. There are thus real well-being benefits from living in an environment where people can be trusted. Social capital is thus related to the value of social networks, bonding with similar people, and bridging between diverse people within the norms of reciprocity [17]. By providing networks of relationships, facilitating job search [18], and engendering the support from others, social capital is strongly related to a person's level of subjective happiness. This extends to the impact of democratic institutions on well-being through their positive influences on political, economic and individual freedoms [19].

Happiness is also dependent upon the level and distribution of income and its correlate, poverty. For this study, the Gini and Theil coefficients [4], [5] will be used to measure relative income inequality. The Gini coefficient is defined as the proportion of the area lying between the Lorenz curves of actual income distribution (red and green lines in Figure 2) and the blue 45-degree straight line of perfect equality. The range of the Gini coefficient is be-

tween 0 and 1, the smaller the better. In this study, we shall innovate by calculating the Gini coefficient not just for the distribution of monetary income, but also for of the distribution of happiness. The Theil coefficient is closely related to the Gini coefficient but avoids some of its mathematical shortcomings.

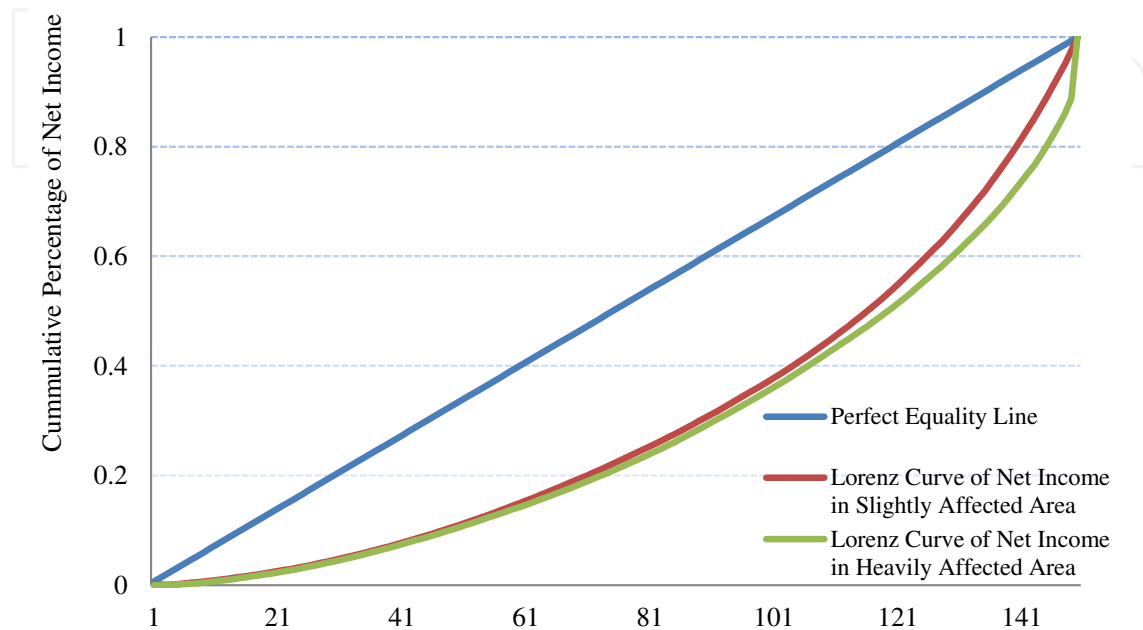


Figure 2. Illustrations of the Lorenz curves and Gini coefficients

But since the Gini coefficient is based upon the entire distribution of income, it is still inadequate to identify and help those households with absolute income below critical levels targeted by social and economic policies. The best-known absolute measures of poverty are the *Foster-Greer-Thorbecke (FGT)* measures of the *incidence*, *depth*, and *intensity* of poverty, to which we add the *urgency* of poverty (Eq. 1).

$$FGT_{\alpha} = \frac{\sum_{i=1}^H \left[\frac{(z - y_i)}{z} \right]^{\alpha}}{N} \quad (1)$$

Where: H = number of poor households; N = number of total households; z = poverty line in terms of the amount spent by the household per day; y_i = actual per capita expenditure; α = measure of the social aversion to inequality, such that, $\alpha=0$ denotes the incidence of poverty; $\alpha=1$ measures the depth of poverty; $\alpha=2$ measures the intensity of poverty; $\alpha=3$ measures the urgency of poverty.

Poverty is defined by monetary measures by the number of people living under the poverty line. The common international poverty line used today is \$1.25 at 2005 purchasing-power parity (PPP) [20]. Other subjective approaches to well-being assessment have been devel-

oped to measure the perceived poverty line, thus complementing or in some cases replacing income-based approaches [21], [22], [23]. In addition, purely subjective yardsticks have been developed to capture self-reported levels of happiness [24] [25].

In the present research, we calculate FGT measures to the incidence, depth, intensity and urgency of unhappiness with respect to mean self-reported happiness for the population. We employ the Lyubormisky questionnaire [24]. We shall also use some of the questions from Argyle and Hills' 29-statement Oxford Happiness Survey [25].

3. Conceptual framework

Based upon the literature, our conceptual framework is portrayed in Figure 3. The rhombus shows the structure of the dependent variable (well-being) that figures to the left of the equal sign in relation 2:

$$\begin{aligned} \text{Well-being } (\omega_p \text{ physical, } \omega_m \text{ mental, } \omega_e \text{ emotional, } \omega_s \text{ social, } \omega_{sp} \text{ spiritual}) &= \beta_0 \text{ basal happiness} + \beta_1 \text{ personality} + \\ &\beta_2 \text{ socio-demo factors} + \beta_3 \text{ economic factors} + \beta_4 \text{ interpersonal} \\ &\text{and work relations} + \beta_5 \text{ institutional factors} \end{aligned} \quad (2)$$

The remaining boxes and arrows trace the direct and indirect influences that lead up to the final level of *SWB*; in other words the separate items and interactions among the arguments to the right of the equals sign in relation 2. These boxes portray the factors that potentially make some people happier or unhappier than others in the face of natural disasters or other external vicissitudes:

- a. Income loss.
- b. Non-income economic factors, such as perceptions of individual vs. aggregate income, unemployment, and inflation. Being unemployed or feeling that one is losing ground with respect to inflation or the neighbors' income, is a far more important drain on happiness than a low level of income itself.
- c. Genetics and the make-up of the brain. This relates to the ambient levels of serotonin and other chemicals that physically create cheerfulness regardless of external circumstances.
- d. Personality factors, such as self-esteem, personal control, optimism, extraversion, and neuroticism. Taken together, b and c constitute what psychologists term the set point. Previous research shows that each individual returns very rapidly to that set point even after major good luck (e.g., winning the lottery) or bad luck (being the victim of a natural disaster). It normally takes between six months and a year to return to one's normal happiness level [1].
- e. Socio-demographic factors, such as age, gender, marital status, education, culture, and religion.

- f. Contextual and situational factors, such as particular employment and working conditions; the stress involved in the work place; interpersonal relations with work colleagues, relatives and friends, and most importantly the marriage partner; as well as living conditions and health.
- g. Institutional factors, such as the extent of political decentralization, perceived levels of corruption, and citizens' direct civil and political participation rights.

Yellow boxes portray the physical and logistical effects of natural disasters, especially as concern demography, both physical and wealth well-being. These elements, as well as social well-being and final SWB (light blue boxes) present great importance to the creation of happiness. The pink boxes represent negative impact on well-being (absolute poverty and relative inequality): they often have a powerful and immediate depressing impact upon SWB. Social well-being may act through both bridging and bonding social capital and rapid rebound to offset the effects of both yellow and pink boxes. If government and NGOs do not intervene, this system can operate internally to determine the level and distribution of SWB. When there is external intervention, however, it may take the various forms represented by the green boxes. These include education, training, and the attraction of better-educated residents, poverty reduction programs, the installation of early warning system, coordination among NGOs and with government agencies, rehabilitation of victims, loans to poor and female-headed households, and the creation of individual and social resilience.

Any or all of these may act perniciously, however. This is because institutional power, economic situation, aid distribution and pre-disaster relationships between and within societies may be harmful to the affected community, which can lead to both social problems and intensified human suffering. Unfortunately, previous research (e.g. [26], [27] and [25]) has often confused the internal anatomy of SWB (to the left of the equals sign in equation (2) with its exogenous determinants (to the right).

This research will estimate the endogenous weights (ω_i) of the components of well-being for each area, compare that structure between the two areas, and then explain and test for significant differences among the determinants β_i of the overall well-being score. Disasters and their direct effects (yellow boxes, Figure 3) have negative impacts on the emotional well-being, financial status, health and even life itself of individuals, families and communities.

3. Methodology

3.1. Testable research hypotheses

Based on the literature and conceptual framework, we shall empirically test five research hypotheses:

1. Average SWB (happiness) of the heavily affected area is not significantly different from that of the mildly-affected benchmark area, suggesting that human beings rebound rapidly from disasters.

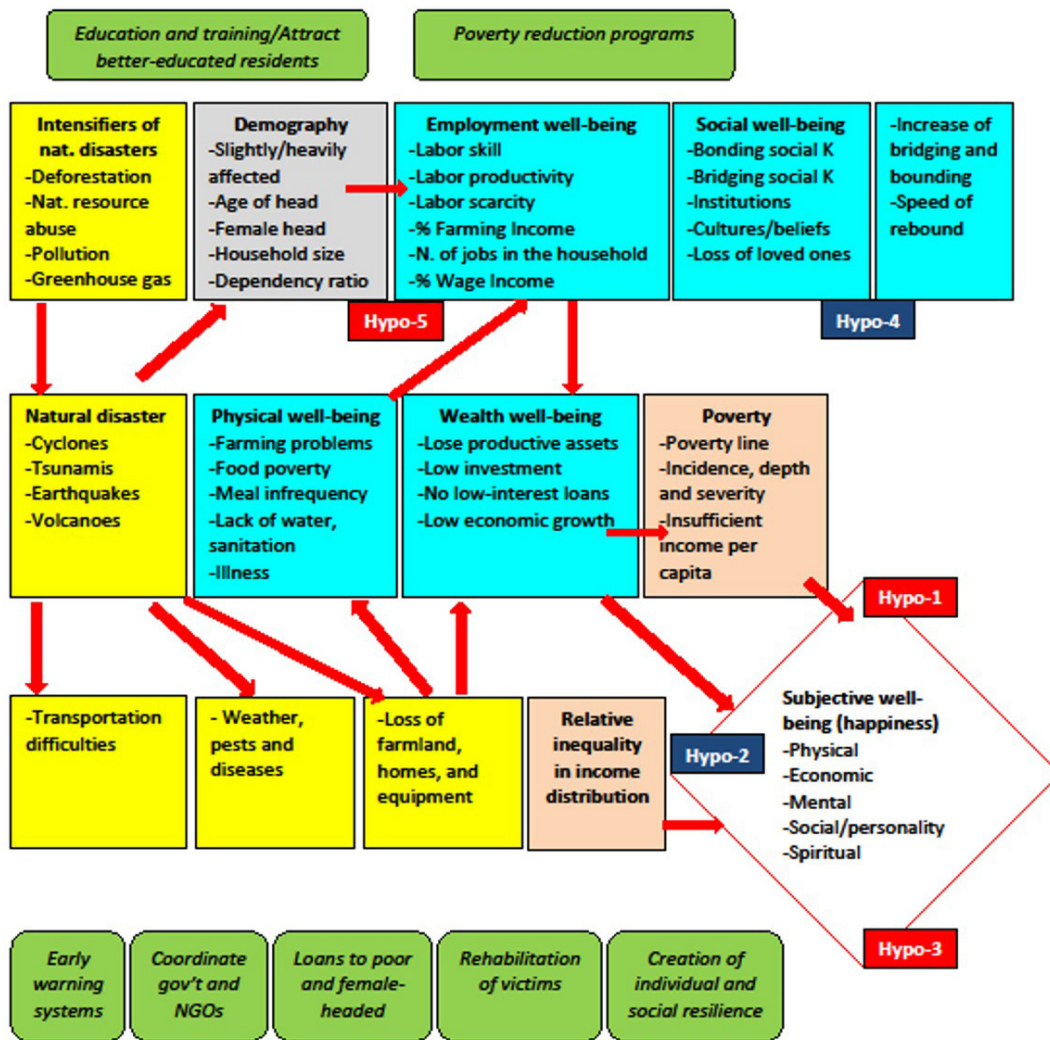


Figure 3. Conceptualization of the causes, pathways, well-being impacts, and corrective policies of a natural disaster

2. Around similar average happiness levels in the two areas, there are much more severe cases of unhappiness, and hence a much worse distribution of happiness, in heavily affected than in slightly affected areas.
3. The internal weighting of the sub-components of happiness differs significantly between the two areas.
4. The social capital of both types (bridging and bonding) in the Nargis heavily-affected area has increased significantly in comparison with the slightly affected area. This should give them higher protection from disasters in the future.
5. The determinants of SWB include income, social capital, education, employment, spiritual meditation, and male gender of household head regardless of the extent of Nargis damage.

3.2. Methods used for data analysis

The present research into the intangible consequences of a natural disaster upon subjective (un)happiness will be highly quantitative. We shall sequentially apply: a) the Foster-Greer-Thorbecke models of the absolute unhappiness, b) Gini and Theil estimations for relative happiness, c) tests for significance differences of means, d) correlation matrices with tests of significance and e) multiple linear regressions to determine the causes of absolute unhappiness. To best gauge the effects of a natural disaster, we have innovated on the three-part Foster-Greer-Thorbecke model of the a) incidence, 2) depth, and 3) intensity of monetary poverty by adding a fourth level 4) urgency. To calculate urgency, one simply takes the level of poverty or ill-being to the third power instead of just the 0th, 1st or 2nd powers. We also innovate in applying all four levels to unhappiness as well as poverty.

The cost-of-basic-needs approach will be used to measure poverty as it is perceived by a household. This should capture the psychological, demographic and social aspects that are taken into account in SWB approaches by considering an individual or household to be extremely, moderately, or not at all poor with respect to their consumption needs. In addition, two different scales to measure SWB or happiness were jointly used to analyze the impacts, if any, of cyclone Nargis on the level and components of happiness in the two areas.

We used Lyubomirsky scale [24], and the Chiang Mai University (CMU) scale, that It includes 28 questions taken or adapted from various sources, including the authors' field experience and the Oxford Happiness Survey [25] (Table 1). Even though the Lyubomirsky and Chiang Mai scales both seek to assess overall happiness, they are built up from quite different concepts.

The Chiang Mai scale is clearly broken down into social capital; as well as physical, mental, emotional, social and spiritual happiness. Each of these five dimensions implies a dominant time horizon, which may be hypothesized to lie on a continuum (Fig. 4).

For example, emotional happiness should logically be significantly correlated with the Lyubomirsky scale in the short run in that emotions are the immediate and often fleeting feelings in people's lives. At the other extreme, spiritual happiness is essentially a long- or eternal-term dimension expected to be positively correlated with Lyubomirsky's general happiness. This is because spiritual happiness is based on the satisfaction derived from inner mindfulness and mental strength regardless of, or even gained from, events in one's life. That strength can be a source of self-realization and inner pride.



Figure 4. Continuum of the sub-components of happiness by time horizon

Questions	Composite score
<i>In general, consider myself a very happy person + Compare to most my peers, consider myself happier + Some people are generally very happy and what extent best describe the respondents + am not unhappy person</i>	Lyubomirsky Subjective Happiness
<i>Types of neighborhoods + agree or disagree that this neighborhood from different backgrounds get on well together + contact organization to solve the problem affecting people in the respondents' local area + share information to others if there is anyone the respondents could ask for help + involvement in the groups</i>	Social Capital
<i>Look attractive + feel fresh and full of energy + have great physical well-being at this time + will probably be free from diseases</i>	Physical Happiness
<i>Love to challenge my mind to create something new and different + often lose myself in the flow of my work or hobbies + feel secure + do have a happy memories + have no worries</i>	Mental happiness
<i>Don't regret the past + can easily/quickly calm down when feel bad/stressed + find myself smiling when no one else around + feel peace in my heart</i>	Emotional Happiness
<i>Can laugh even in the face of difficulty + know myself and exactly what want/need + respect myself + have clear faith or religion + feel great peace in my soul + willingly accept what happens to me + accept that others may have different beliefs + feel my life is very bright + can be myself however am or where go + am satisfied about everything in my live</i>	Spiritual Happiness
<i>Love to share with other people + feel harmony with others people + am not afraid of what others may think + My own freedom is more important than what others think</i>	Social Happiness

Table 1. Component questions from the Lyubomirsky and Chiang Mai scales and the composite scores

3.3. Data collection

Sources of data were both local and national. We first amassed the secondary data on the Irrawaddy Division (Cyclone Nargis affected area). The major sources for secondary data were the Myanmar Agriculture Services, Settlement and Land Record Department, Central Statistical Organization, United Nation Development Program, Food and Agricultural Organization, World Food Program, United Nation Office for Coordination of Humanitarian Affairs, United Nations International Children's Emergency Fund), Groupe de recherche et d'échanges technologiques and other non-governmental organizations. Secondary data of

the township, village profiles, maps, annual progress reports, project documents reports were also collected.

The questionnaire was designed to inquire about the socio-economic situation, use of economic infrastructures, social capital and happiness levels of individual households in the two research areas. The time frame of an interview was set at forty-five minutes to one hour. A pilot survey was conducted in May 2010 in Pyapon Township. The pilot survey data revealed the impact of local norms, gaps in information, and the degree to which data analysis would be feasible. Some assumptions and survey questions had to be adjusted before the main survey was undertaken. Final data collection involved 298 respondents: 148 from Pyapon and 150 from Bogalay.

4. Case study results

4.1. Hypothesis 1

Average SWB of the heavily affected area is not significantly different from the mildly-affected benchmark area, suggesting that human beings rebound rapidly from disasters.

The results shown in table 2 fail to invalidate hypothesis 1 as to the equality of average happiness levels in the two townships. The average score of heavily-affected Bogalay on the Chiang Mai scale (3.143) is not significantly different from the scale of slightly affected Pyapon (3.202). The level of significance (ie., the probability of committing an error in assuming a significant difference) is 12.8%, higher than the 10% cut-off point established for this study. In terms of the Lyubomirsky scale, the score of happiness in Bogalay is actually higher than in Pyapon (3.087 vs. 3.078), but this result is extremely insignificant (significance = 0.879).

The results further show that only average mental happiness is significantly lower in Bogalay (3.00) than in Pyapon (3.20). This is presumably because of the residual mental anguish associated with bad memories, nightmares, missed loved ones, and the karmic questionings noted above. We have also determined from a correlation matrix (not shown here) that all the components of happiness are very highly correlated with each other, except for emotional and social happiness. The former is individual; while the latter is collective, a reflection of social capital and human relations. Further research will have to be done to determine why this is so.

4.2. Hypothesis 2

Around similar average happiness levels in the two areas, there are much more severe cases of unhappiness, and hence a much worse distribution of happiness, in heavily affected than in slightly affected areas.

We must reject hypothesis 2, however, because overall happiness and its five components do not mask significantly greater variations around the mean for Bogalay than for Pyapon. On the one hand, the coefficients of variation across households within the two samples

Happiness	Nargis damage	Means	Heavy minus slight	Std. Dev'n	Coeff var'n	t	Sig.																																																																				
Average CMU score	Heavy	3.143	-0.059	0.339	11%	-1.53	0.128																																																																				
	Slight	3.202		0.337	11%			Average Lyubomirsky score	Heavy	3.087	0.009	0.447	14%	0.15	0.879	Slight	3.078	0.500	16%	Physical AHLS score	Heavy	3.122	0.044	0.614	20%	0.61	0.545	Slight	3.078	0.625	20%	Mental AHLS score	Heavy	3.004	-0.199	0.451	15%	-3.69	0.000	Slight	3.203	0.482	15%	Emotional AHLS score	Heavy	3.031	-0.024	0.372	12%	-0.51	0.608	Slight	3.055	0.435	14%	Social AHLS score	Heavy	3.205	0.108	0.671	21%	1.38	0.168	Slight	3.097	0.688	22%	Spiritual AHLS score	Heavy	3.271	0.128	0.469	14%	-1.40	0.163
Average Lyubomirsky score	Heavy	3.087	0.009	0.447	14%	0.15	0.879																																																																				
	Slight	3.078		0.500	16%			Physical AHLS score	Heavy	3.122	0.044	0.614	20%	0.61	0.545	Slight	3.078	0.625	20%	Mental AHLS score	Heavy	3.004	-0.199	0.451	15%	-3.69	0.000	Slight	3.203	0.482	15%	Emotional AHLS score	Heavy	3.031	-0.024	0.372	12%	-0.51	0.608	Slight	3.055	0.435	14%	Social AHLS score	Heavy	3.205	0.108	0.671	21%	1.38	0.168	Slight	3.097	0.688	22%	Spiritual AHLS score	Heavy	3.271	0.128	0.469	14%	-1.40	0.163	Slight	3.143	0.339	14%								
Physical AHLS score	Heavy	3.122	0.044	0.614	20%	0.61	0.545																																																																				
	Slight	3.078		0.625	20%			Mental AHLS score	Heavy	3.004	-0.199	0.451	15%	-3.69	0.000	Slight	3.203	0.482	15%	Emotional AHLS score	Heavy	3.031	-0.024	0.372	12%	-0.51	0.608	Slight	3.055	0.435	14%	Social AHLS score	Heavy	3.205	0.108	0.671	21%	1.38	0.168	Slight	3.097	0.688	22%	Spiritual AHLS score	Heavy	3.271	0.128	0.469	14%	-1.40	0.163	Slight	3.143	0.339	14%																				
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	Slight	3.203		0.482	15%			Emotional AHLS score	Heavy	3.031	-0.024	0.372	12%	-0.51	0.608	Slight	3.055	0.435	14%	Social AHLS score	Heavy	3.205	0.108	0.671	21%	1.38	0.168	Slight	3.097	0.688	22%	Spiritual AHLS score	Heavy	3.271	0.128	0.469	14%	-1.40	0.163	Slight	3.143	0.339	14%																																
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	Slight	3.143		0.339	14%																																																																						

Table 2. Tests of significant differences in means between the two areas (Slight damage: Pyapon; Heavy damage: Bogalay).

(Table 2) are very similar for happiness and all its components, suggesting that -- like the means -- the distributions of happiness overall and by category are also roughly similar. On the other, Table 2 suggests extremely little difference in either the absolute incidence (four extended Foster-Greer-Thorbecke measures) or the relative distribution (Theil and Gini coefficient) of overall happiness and most of its subcomponents, either for the combined or the Pyapon and Bogalay samples. The differences would probably not be significant if appropriate statistical tests were available; except in the case of the incidence, depth, intensity, and urgency of mental unhappiness in Bogalay, for the reasons stated above. This single exception does not prevent us from clearly rejecting hypothesis 2.

What is more, the distribution of happiness is much more equal than the distribution of income per capita (as measured by the Gini and Theil coefficients) of the two samples (Table 4 and Figure 5). The incidence, depth, and intensity of unhappiness are not only radically less pronounced than the incidence, depth, and intensity of monetary poverty (cf. Figure 2); they are virtually identical for the heavily- and slightly-affected areas. As a corollary to the Easterlin paradox, we may posit that greater poverty does not make people proportionately less happy.

4.3. Hypothesis 3

The internal weighting of the sub-components of happiness differs significantly between the two areas.

	Regression		Absolute unhappiness			Relative happiness	
	Anatomy	Incidence	Depth	Intensity	Urgency	Quintile ratio	Gini coef.
CMU SWB score							
<i>Combined sample</i>		35.9%	0.082	0.027	0.011	1.38	0.062
<i>Slight</i>		37.2%	0.084	0.028	0.012	1.39	0.063
<i>Heavy</i>		34.7%	0.080	0.027	0.010	1.36	0.056
Physical happiness							
<i>Combined sample</i>	.009***	35.9%	0.189	0.129	0.108	1.76	0.119
<i>Slight</i>	0.204	37.8%	0.199	0.146	0.134	1.78	0.128
<i>Heavy</i>	0.072*	34.0%	0.178	0.113	0.082	1.74	0.125
Emotional happiness							
<i>Combined sample</i>	.000***	38.6%	0.193	0.130	0.109	1.65	0.108
<i>Slight</i>	0.178	39.2%	0.199	0.131	0.105	1.67	0.119
<i>Heavy</i>	0.000***	38.0%	0.187	0.130	0.112	1.64	0.111
Social happiness							
<i>Combined sample</i>	0.19	37.6%	0.194	0.134	0.121	1.83	0.129
<i>Slight</i>	0.052*	39.9%	0.221	0.173	0.175	1.86	0.139
<i>Heavy</i>	0.83	35.3%	0.167	0.097	0.067	1.8	0.134
Mentalhappiness							
<i>Combined sample</i>	0.186	34.6%	0.136	0.070	0.045	1.54	0.093
<i>Slight</i>	0.440	29.1%	0.097	0.043	0.025	1.5	0.099
<i>Heavy</i>	0.398	40.0%	0.173	0.097	0.065	1.52	0.099
Spiritualhappiness							
<i>Combined sample</i>	.000***	24.8%	0.069	0.027	0.013	1.49	0.088
<i>Slight</i>	0.000***	23.0%	0.061	0.025	0.013	1.48	0.095
<i>Heavy</i>	0.069*	26.7%	0.077	0.028	0.012	1.49	0.096

Table 3. Absolute unhappiness and the distribution of relative happiness in the two areas (Slight damage: Pyapon; Heavy damage: Bogalay).

The results shown in table 3 fail to invalidate hypothesis 3. The fact that the two Chiang Mai and Lyubomirsky scales contain very different components allows us to regress one on the other. In this case, we shall “explain” the Lyubomirsky score based on the five separate dimensions of the Chiang Mai scale to determine their relative importance to inhabitants of the two distinct areas of the Irrawaddy Delta. Three separate regressions were run for: a) the entire 2980 person sample and b-c) the 148 to 150 people in each area. The dependent variable for all three equations was the Lyubomirsky happiness score of the household, predicted to significantly increase as each dimension of short- or long-term happiness. The first three data columns of Table 5 indicate that for the overall sample, neither mental nor social happiness was a significant explanatory variable of the Lyubomirsky scale. In the mental dimension, two years after Nargis, people still had an indelible memory of this tragedy. Men-

	Monetary income/poverty		Happiness/unhappiness	
	Pyapon	Bogalay	Pyapon	Bogalay
	<i>Slight</i>	<i>Heavy</i>	<i>Slight</i>	<i>Heavy</i>
Gini coefficient	0.400	0.450	0.063	0.056
Theil Index or quintile ratio	0.250	0.380	0.012	0.010
Incidence	39.0%	67.0%	37%	35%
Depth	0.16	0.32	0.084	0.08
Intensity	0.08	0.20	0.028	0.027
Urgency	0.05	0.17	1.39	1.36

Table 4. The relative and absolute distribution of monetary income (Slight damage: Pyapon; Heavy damage: Bogalay).

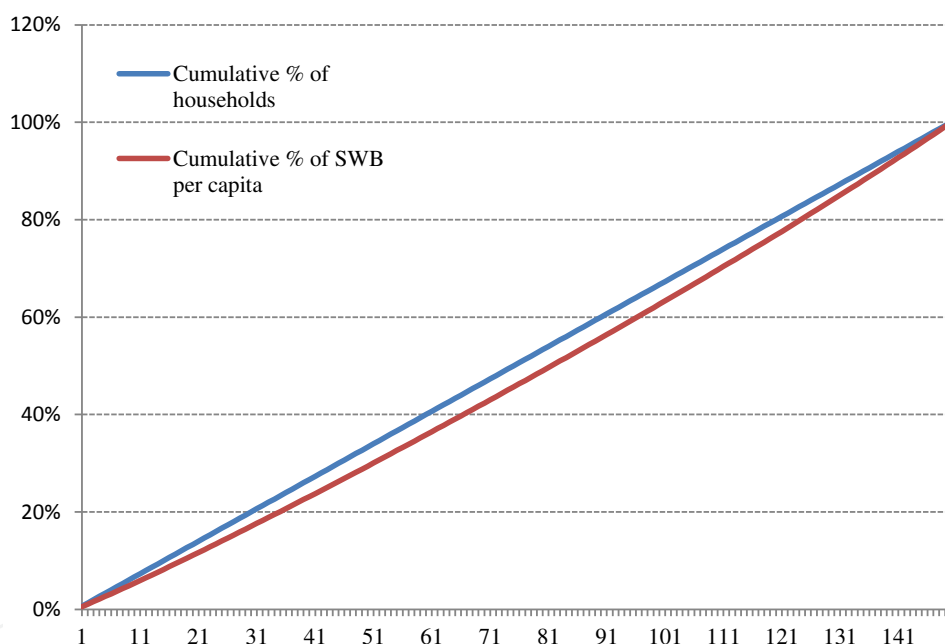


Figure 5. The Lorenz curves and Gini coefficients of unhappiness for both Bogalay and Pyapon.

tal unhappiness persists in the long-run, especially in Buddhist societies, because it is difficult to forget and even harder to forgive what people assume to have been their own errors in previous generations.

When people become victims of natural disasters, they ruminate on the horrible mistakes they must have made in their previous incarnation to merit the terrible fate of losing all one’s family and possessions. At the time of the survey, it was also the monsoon season, with very stormy weather. When the children heard the thunder and saw the lightning, we

Type of happiness	Overall sample			Heavy damage: Bogalay			Slight damage: Pyapon		
	B	t	Sig.	B	t	Sig.	B	t	Sig.
<i>Physical</i>	0.18	2.61	.009***	0.17	1.81	0.072*	0.12	1.28	0.204
<i>Mental</i>	0.11	1.33	0.190	0.1	0.85	0.400	0.09	0.78	0.440
<i>Emotional</i>	0.26	3.81	.000***	0.4	3.57	.000***	0.12	1.35	0.178
<i>Social</i>	-0.12	-1.31	0.190	0	-0.2	0.830	-0.22	-1.96	0.052*
<i>Spiritual</i>	0.57	4.11	.000***	0.38	1.83	0.069*	0.84	4.36	.000***

Table 5. Lyubomirsky happiness scale as determined by the five components of the Chiang Mai happiness scale. Dependent variable = Household-level Lyubomirsky scores within the designated sample

observed them grab their toys and run into the house. To make matters worse, their parents were also facing problems of crop failure that season. This added to the mental stress and anguish of all households, taking away any significant connection with inter-household differences in overall happiness.

In terms of the social dimension, we would also have expected good relations with others to increase happiness. However, social happiness is non-significant in the combined and Bogalay regressions and significantly negative in the case of Pyapon (Table 5). This surprising result may partially be explained by resentment over how the aid after the cyclone was distributed. Based on the selection criteria for which areas and households were to receive relief, conflict arose between vulnerable households and community-based organizations. Because most of the NGOs knew little about Pyapon and which households were truly the most vulnerable, they sought direction from the community-based organizations. But these latter were corrupt and subject to favoritism, leading to injustice and unhappiness on the part of just about everyone.

The Bogalay regression (Table 4) indicates that physical, emotional, and spiritual dimensions are strongly correlated with happiness in the Lyubomirsky sense, as predicted. However, both mental and social happiness are not significant for the same reasons as for the overall sample. Indeed, the people of Bogalay arguably suffered as much physical, livelihood, environmental, and human loss as almost anywhere in the Delta region. There is thus an enormous burden of karmic suffering from what has happened in their lives. This is consistent with the results of the t-tests for significant differences in means, under which only

mental happiness was significantly different (and lower) in the heavily-affected area. It is not surprising, then, that happiness in Bogalay does not spring from the mental dimension.

The Pyapon regression (Table 4) is quite different. Spiritual happiness accounts for an astounding 84 percent of the overall score on the Lybomirsky scale. This reflects the overwhelming importance of individual karma in people's perceptions of happiness in the slightly affected area, in the sense that the people of Pyapon take strong comfort and satisfaction from the fact that their previous good deeds (*kusula*) saved them from the eye of the cyclone. This is also related to the fact that the social dimension in Pyapon is significantly negative. Social conflict arose in Pyapon because of both aid distribution problems, and high population density, and dependency ratios. An ugly social situation may therefore help to explain the strong spiritual retreat into interiorization, meditation, and solace-seeking in religion in Pyapon. Finally, the physical, mental, and emotional dimensions of happiness have nothing significant to do with the Lyubomirsky score, denoting a random distribution of these elements across happy and unhappy people in Pyapon.

These differences lead us to accept hypothesis 3. We further determined, in results not shown, that average scores of physical, mental, emotional, social and spiritual happiness of male-headed households were all higher than for their female-headed counterparts.

4.4. Hypothesis 4

The social capital of both types (bridging and bonding) in the Nargis heavily-affected area has increased significantly in comparison with the slightly affected area. This should give them higher protection from disasters in the future.

Various analyses lead us to reject hypothesis 4. As mentioned, Nargis affected status has no significant effect upon happiness. But this is not the case with social capital, which has a positive and significant correlation with happiness roughly equal to meditation at the temple. In the sustainable livelihood context, social capital is taken to mean the forms of mutual social assistance upon which people draw. These include networks such as caste, play groups, men's groups, women's associations, and religious groups. These networks can provide an informal safety net during difficult times and play a pivotal role in helping people access resources needed after a disaster. One of the most significant characteristics of resilient communities is the extent to which they work together towards a common aim, a function of their social cohesion. Groups that are homogeneous in terms of class, ethnicity, livelihood or wealth are more likely to cooperate in building resilience to disaster.

Village-level interviews determined that the relations between villagers and their formal and informal leaders were particularly strong. Indeed, one would expect that there would be an increase in joy as people banded together to help each other rebuild their lives. This is, as we have seen, an example of *bonding*. We would also expect that the villagers would be assisted by new NGOs and other organizations from outside, with whom they had had little or no contact in the past. This is an example of *bridging*. Where these positive conditions exist, they can offset the social unhappiness noted above from how aid is delivered.

Thus, social capital does have a positive influence on happiness. However, the specific formulation of hypothesis 4 stipulates that “the social capital of both types (bridging and bonding) in the Nargis heavily-affected area has increased significantly in comparison with the non-heavily affected area.” To test the hypothesis we conducted a t-test to compare the mean levels of social capital (and its bonding and bridging sub-components) between the two areas (Table 5).

In heavily-affected Bogalay, people feel discriminated against less often. The overwhelming reason for discrimination in both townships is the same: poverty. They are more religious than the people in Pyapon (but not significantly more than before Nargis). Indeed, there is no significant increase in temple-going, prayer, or meditation as a result of the cycle in either township. They also have been living longer together in Bogalay significantly longer, and have been confronted by a more fearsome external menace.

Based on these findings, one would logically expect their levels of social and bonding capital to be higher than in Pyapon. However, table 6 shows the exact opposite. The people of Bogalay have significantly lower scores for overall social capital and bonding capital within the community. Bridging capital with the outside world and organizations is also less, but not significantly so. While trustworthiness is higher within the community in Bogalay, people from different backgrounds get on less well together. Presumably because of the loss of family members, people in Bogalay have fewer people to ask for help when they are ill or financially strapped, resorting to strangers or NGOs (bridging) more often than the spouse or close family members (bonding).

People in Bogalay also get together in discussion-action groups less; when they do, they are more involved in NGO-type bridging than local bonding groups. It is equally striking that the main significant differences between the two areas are not in their means but in the variances around the means. This means that there are more persistent differences within communities than between the differentially affected areas, confirming that the social fabric has not been strengthened in the hard-hit area. There was undoubtedly less need for people in slightly-affected Pyapon Township to develop bonding or bridging social capital because individual households were largely able to put their lives back together again on their own. Indeed, there was competition between spending time building social capital and spending time meditating by oneself on the results of one’s previous life.

We are thus in a position to clearly reject hypothesis 4. Although the people of heavily-affected, Bogalay trust each other more and are more active religiously, overall social and bonding capital are significantly lower. Bridging capital is also, lower, though not significantly so, because (a) people from differing backgrounds do not get along and (b) in the absence of close relatives; distant neighbors are presumably put upon to help in sickness and financial distress. Meanwhile, opportunities for compensation for the lack of social capital by building bonding capital, such as participating in local discussion-action groups, are not taken up as frequently as in Pyapon Township, the slightly affected area. Strengthening social capital in the future could overcome traditional barriers and promote working together for a common cause as the basis for more resilient responses to disaster in the future.

Social capital indicator	Nargis damage	Mean	Heavy-slight	t	Sig. diff.
Social capital score	Heavy	0.79	-0.01	-2.06	0.040
	Slight	0.80			
Bridging social capital score	Heavy	0.25	-0.01	-0.94	0.348
	Slight	0.26			
Bonding social capital score	Heavy	0.56	-0.03	-2.75	0.006
	Slight	0.59			
Seek bonding help from: 8 = spouse, 7 = other family, 6 = relative, 5 = friends, 4 = neighbor	Heavy	0.70	-0.10	-3.99	0.000
	Slight	0.80			
People from different backgrounds get on well together: definitely agree = 6; definitely disagree = 3, don't know = 2, too few people in neighborhood = 1, all same backgrounds = 0	Heavy	0.76	-0.10	-4.26	0.000
	Slight	0.86			
If you are in financial straits for survival, seek bonding help: husband / wife / partner = 9, other hh member = 8, relative = 7, friends = 6, neighbor = 5	Heavy	0.07	-0.09	-2.87	0.004
	Slight	0.16			
During last year, participated in bonding discussion-action group: 7 = others, 6 = religious, 5 = sports, 4 = social, 3 = self-help	Heavy	0.17	-0.11	-2.8	0.005
	Slight	0.28			
Trustworthiness in neighborhood: most people = 4 ..., no one is trust worthy = 1	Heavy	0.96	0.05	2.81	0.005
	Slight	0.92			
How long have you lived in this area? (years)	Heavy	6.94	0.16	2.54	0.012
	Slight	6.78			
Sought bridging help for community problems from: 2 = GO NGO, 3 = NGO	Heavy	0.08	0.02	1.25	0.214
	Slight	0.06			
Increase in trips to temple per month after Nargis	Heavy	0.36	0.31	1.18	0.240
	Slight	0.05			
Cause of discrimination: race = 1, religion = 2, gender = 3, economic = 4, health = 5, social = 6	Heavy	0.67	-0.01	-1.1	0.273
	Slight	0.68			
Community spirit: people help each other = 3, go own way = 2, mixture = 1	Heavy	0.95	0.02	0.99	0.322
	Slight	0.93			
Participated in a bridging discussion-action group: 1 = GO NGO, 2 = NGO	Heavy	0.08	-0.01	-0.54	0.591
	Slight	0.09			
Seek bridging help from: work colleague = 4, voluntary/ other org. = 3, other = 2	Heavy	0.11	0.01	0.46	0.644
	Slight	0.11			
Satisfaction of the neighborhood: very satisfied = 5... very dissatisfied = 1	Heavy	0.80	0.00	0.06	0.950
	Slight	0.80			
If you are ill in bed, seek bridging help: 3 = colleague, 2 = voluntary or other org	Heavy	0.00	0.00	-0.01	0.992
	Slight	0.00			

Table 6. Tests of means and variances of overall, bonding, and bridging capital scores by Nargis-affected areas

4.5. Hypothesis 5

The determinants of SWB include income, social capital, education, employment, spiritual meditation, and male gender of household head regardless of the extent of Nargis damage.

The results reported in Table 7 support hypothesis 5. To assess the impact of demographic characteristics upon happiness with a view to better social targeting, we ran a regression to determine overall happiness [Equation 2] as measured by the Chiang Mai scale as a possible function of income, income squared (we expected a negative sign due to the Easterlin paradox), social capital, the employment rate/number of jobs, years of schooling of the household head, prayer/meditation, the quality of the diet, the regularity of meals over the previous week, and Nargis-affected area (Table 7). As expected, the sign on net income per capita was positive, while the sign on net income per capita squared was negative. This signals a decreasing rate of improvement of happiness as income increases, consistent with the Easterlin paradox. Similarly, education, total jobs in the household and the employment rate tended to increase happiness. This supports Lane's [28] contention that work is a source of self-realization in and of itself; rather than a necessary burden to be taken up in order to earn enough income for consumption, the view held by traditional neoclassical economics.

	B	Std. Error	Beta	t	Sig.
Constant	3.32	.16		20.42	.000
Physical					
Nargis affected status	-.06	.04	-.08	-1.35	.179
Average number of meals, past 7 days	-.09	.04	-.12	-2.19	.029
Level in food scarcity pyramid	-.02	.01	-.10	-1.68	.094
Economic					
Net income per capita	.00	.00	.37	3.27	.001
Net income per capita squared	.00	.00	-.33	-2.95	.003
Total no of jobs in household	.07	.03	.12	2.30	.022
Employment Rate	.16	.09	.10	1.82	.070
Social					
Schooling years of household head	.03	.01	.17	3.08	.002
Social capital score (the lower the better)	-.01	.01	-.11	-2.03	.044
Gender of household head (female)	-.11	.06	-.10	-1.86	.064
Spiritual					
Times pray per month after Nargis	-.003	.00	-.18	-3.27	.001
Time meditate in temple last year	.01	.00	.11	2.11	.035

Table 7. Regression of Chiang Mai Happiness Score upon a Complete set of Socio-Economic Factors (Adjusted R-squared=0.192; F-statistic= 6.867)

Furthermore, although long term meditation at the temple seems to increase happiness, the frequency of prayer decreases it (this is possibly because prayer often involves a mixture of noble and self-interested requests). Surprisingly, both the regularity and the diversity of the diet seem to decrease happiness. This result – which would support periodic fasting as an uplifting pursuit – certainly merits further research beyond the scope of this chapter.

Variable	Aver. physical, mental, emotional, spiritual scores		Social capital score (the lower the better)		Interest rate for education and training (%)		Interest rate for health care and medicine (%)		Interest rate for food and drink (%)	
	F	M	F	M	F	M	F	M	F	M
Gender hh head										
Sample size	41	257	41	257	41	256	41	257	41	257
Mean by gender	3.0	3.2	15	15	2	1.5	2.3	1.8	1.9	1.0
Standard dev'n	0.3	0.4	2.9	3.8	4.5	3.5	4.7	3.7	4.4	2.9
Mean difference	-0.17		0.08		0.52		0.54		0.87	
Levene's test for Equal variances	2.81		2.82		4.87		4.95		8.35	
Sig. variances	0.09		0.09		0.03		0.03		0.01	
t-test for equal means	-1.83		-3.27		2.34		2.35		-1.79	
Sig. means	0.07		0		0.02		0.02		0.09	

Table 8. T-tests for significant differences by gender of household head

A t-test was employed to detect significant differences between the 257 households with male and 41 female heads in terms of the likelihood to experience difficulty in terms of happiness, social capital, and interest rates for various types of loan. We found (Table 8) that the social capital of males is better than that of females in both types of Nargis- affected areas, since a man can spend his time in social activities after working hours. Most people use pawn shops for credit, since the interest rates from other sources are too high for them. However, social capital is very important if they want to borrow money from pawn shops. Since female headed households generally lack such social capital, the interest rates charged to female headed households are significantly higher than those charged to male headed households for food, drinks, and even health care.

The interest rate for education is also higher for female headed households, but much less so than for other categories of loan. However, the dummy variable Nargis-affected status is not significant the 0.10 level or better. We therefore cannot reject hypothesis 5.

5. Conclusions, limitations and recommendations

5.1. Conclusions

The comparison between two areas differentially affected by cyclone Nargis has led to the acceptance of hypotheses 1, 3, and 5 (Figure 3) and the rejection of hypotheses 2 and 4. We have demonstrated that the basic needs and economic possibilities for residents from the heavily affected area less sufficient and more arduous than in the slightly affected area. Nonetheless, Bogalay inhabitants are surprisingly happy living under the poverty line and trying their best to improve their future. The chapter has shown that the happiness of the heavily affected area is not significantly different from that of the slightly-affected area, suggesting that human beings rebound rapidly from disasters. Nor is there a greater tendency for the depth, intensity or urgency of unhappiness to be higher in the more heavily-affected area. For both areas, spiritual happiness is more than twice as important as emotional happiness, and physical happiness is less than one-third as important as spiritual happiness. Access to health care and education are no less good in the heavily-affected area.

The internal weighting of the sub-components of happiness does differ significantly between the two areas (hypothesis 3). In heavily affected Bogalay, a dark cloud of mental anguish lingered a full 27 months after the passage of Nargis; and overall social, bonding and bridging capital were significantly lower. People living in households with female heads were significantly more likely to experience difficulty meeting their needs than their male-headed counterparts, largely because of their lower social capital and the resulting exorbitant interest rates they must pay.

We have further determined that the impacts of a natural disaster tend to strengthen social capital; while assistance and aid, if poorly administered, can undermine it. Social capital has become more important than ever because of the critical significance of knowledge-sharing to organizations. The informal safety net during disasters plays a pivotal role in helping people to access the resources such as credit. Presentation, as we have done, of the nature of the social capital in Myanmar should help policy makers, researchers, community workers and non-government organization as they work to identify, and bring help to, the most vulnerable of the vulnerable. Thus, social capital can play a strategic role in rehabilitating organizational performance, farm productivity, and mental health following a disaster.

5.2. Limitations and strengths of the research

Due to limited statistical information on the pre-cyclone period, this research has had to resort to a contemporaneous comparison of two areas differentially affected by cyclone Nargis. Despite the similarity of the two areas in other ways, no two townships are perfectly comparable, so this study cannot be fully considered a “controlled experiment.”

The study has presented new applications of several methods (the new Chiang Mai scale, Gini coefficient, Lorenz curve, and the extended Foster-Greer-Thorbecke indicators) to the study of the level and distribution of social capital and happiness. It is hoped that these methods can be applied to other studies in the future. This will provide comparisons over

time and across space of the level and causes of subjective well-being, and contribute to the external validity of the findings.

5.3. Suggestions for further research and policy

The social and policy motivations of this study have been to provide a statistically assessment of the impacts of cyclone Nargis for use by regional councils and national planners, in the hope that such knowledge would help them to better define their role in post-disaster recovery. The results may also serve to inspire similar studies into the psychological and intangible effects of natural disasters in other countries for other periods.

Much more work on coordination among researchers and between researchers and key disaster response decision-makers is also needed to realize the full potential of post-disaster mental health research. Several levels of coordination are needed for successful post-disaster research: within inter-disciplinary teams of researchers; between researchers and administrative agencies that have access to data that can facilitate research; between researchers and service providers; and among the many different sets of individuals and organizations that provide services, often with inadequate coordination, to disaster victims.

In this, for example, since the two study areas differ substantially, and the determinants of income per capita are not the simple opposites of the determinants of the intensity of food poverty, policy implications must be targeted both geographically and in terms of the dimension of well-being. The government and non-governmental organizations should put in place new loans to help female-headed households. State and local economic development officials should focus their efforts on encouraging education and retaining and attracting better-educated residents. The resulting social capital will be the best gauge of the continued rehabilitation of the victims and the creation of individual and social resilience in case of future events.

Acknowledgements

The authors express their sincere gratitude to the Heinrich Boell Foundation for its generous financial support of the first author's Master's degree studies at Chiang Mai University, as well as the field research project that led to the findings reported in this chapter.

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