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*COMMUNITY RECOVERY AND SUSTAINABLE DEVELOPMENT IN THE REGION OF
SEISMIC CENTRE IN TAIWAN AFTER THE 1999 CHI-CHI EARTHQUAKE*

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Summary: The major purpose of this study is to evaluate the progress of community recovery and sustainable development of the region of seismic centre in Taiwan after the 1999 Chi-Chi Earthquake. Data analyzed in this study were collected from a face-to-face interview survey conducted in the research site of Tzu-Shan Town, Nan-Tau County, an area close to the epicentre of Chi-Chi Town, Nan-Tau County. The analysis of this study indicates that before the earthquake the residents of Tzu-Shan Town already faced two serious problems in economics and employment; and the earthquake made the situation even worse for the residents of Tzu-Shan Town. Findings of this study show that the willingness to purchase earthquake insurance and to pay for public facilities during disaster period is positively associated with education and income. In terms of social resources, as high as 84.5% respondents indicated that self-help was most helpful to them after the earthquake, followed by friends and relatives (9.7%); whereas government agencies and NGO's had provided only limited help. A strong consensus among the respondents (82%) indicated that it was necessary to establish a designated agency to take charge in disaster management and resource allocation. Most respondents also considered central government should take the lead to promote recovery.

Keywords: community recovery, sustainable development, welfare demands, income maintenance, social capital, welfare resources allocation.

Community Recovery and Sustainable Development in the Region of Seismic Centre in Taiwan after the 1999 Chi-Chi Earthquake

1. INTRODUCTION

It has been six years since the Chi-Chi Earthquake occurred in 1999; it is necessary to assess the living status and the effectiveness of reconstruction policies. The major purpose of this study is to evaluate the progress of community recovery and sustainable development of the region of seismic centre in Taiwan after the 1999 Chi-Chi Earthquake.

By analyzing survey data and in-depth interviews, this study aims to achieve three objectives. In the first place, this study proposes to evaluate the perception of vulnerability, employment status and income maintenance of the people in the region of seismic centre before and after the earthquake in general, and the accessibility of disaster-assistance programmes in particular.

Secondly, this study aims to assess to what extent social capital helps to reduce the negative impacts of earthquake disaster through the investigation of the functioning of formal sectors, such as government agencies, non-government organizations (NGO's) and community-based organizations (CBO's); and informal sectors, such as family, friends, and kinship networks; as well as the interaction and integration of the two social support systems.

Thirdly, this study attempts to examine civilian public's views about the mechanisms of welfare resources allocation during disaster crises, with special focus on institutional regulations of social policies regarding disasters emergencies; the provision of mitigation measures such as disaster insurance; the promotion of reconstruction through public-private partnership; and the equity of welfare resources allocation during disasters emergencies.

2. VULNERABILITY, RECOVERY AND DISASTER MANAGEMENT

Based on the conception defined by Blaikie and his associates (1994), disasters could be interpreted as the outcomes of environmental hazards that impacted vulnerable populations. Accordingly, an extraordinary hazard event such as an earthquake or flood only functions as a trigger event that brings about the disaster resulting from deep-rooted socio-economic and political inequalities embedded in social structure.

Vulnerability, according to Cannon's (1994) definition, includes two major characteristics of people: (1) characteristics resulting from disadvantaged socio-economic status (such as class, race, ethnicity, gender and age) that make people susceptible to environmental hazards; and (2) characteristics that constrain people's capacity to avoid, respond to and recover from the calamities of environmental hazards.

Bolin and Stanford's (1998) study of the recovery from the Northridge earthquake in the U.S. found that victim's unmet needs after disasters were the outcomes of two factors: one is the degree of social inequalities that makes people vulnerable; the other is the inadequacies of disaster-assistance programmes provided by governments.

Various research had investigated the importance of risk mitigation measures (RMMs) to effective disaster management (Kunreuther, 2001). Among them a substantial body of literature had contributed to the effectiveness and limitations of flood insurance (National Flood Insurance Program, NFIP) on disaster mitigation in the U.S. (Burby, 2001; Blanchard-Boehm et al, 2001).

The experience of the U.S. indicated that the majority of floodplain dwellers tended to resist purchasing flood insurance (Blanchard-Boehm et al, 2001). Theoretically there are three major factors that determined people's decision to purchase disaster insurance; one is psychological defence mechanisms; another is the perception level of vulnerability; and the third factor is economic cost (Baumann and Sims, 1978; Epple and Lave, 1988). Empirical evidence also found another two determining factors such as the enforcement of mortgage requirement linked to insurance and people's expectation regarding the adequacy of disaster-assistance programmes provided by the governments (Blanchard-Boehm et al, 2001).

Past research about post-disaster recovery often found the importance of sustainable community during reconstruction period (Tobin, 1999). Buckland and Rahman's (1999) study of the 1997 Red River Flood in Canada showed strong association between pattern of community development and responsive capacity of community to flooding.

After the impact of Kobe earthquake in 1995, Japan witnessed two major social changes; one is an increase in voluntary and non-government activities, the other is closer cooperation between local governments and community-based organizations. Japan's Kobe experience provided evidence of four crucial factors of sustainable civil society after the major disaster: (1) if daily activities and services were organized by local resident's associations; (2) if these activities and services provided economic incentives; (3) if there were strong leaderships in community decision-making; and (4) the building of social support system in the community (Shaw and Goda, 2004).

2.1 Research hypotheses

This study proposes to test the following research hypotheses:

1. The experience of past disaster should enhance respondent's risk perception, and therefore increase their willingness of adopting disaster mitigation measures, such as purchasing earthquake insurance, or paying for public infrastructure during disasters.

2. Education has a positive effect on respondent's perception of disaster risk, and should increase their likelihood of adopting disaster mitigation measures.

3. Household income reflects respondent's ability to pay for mitigation measures; therefore the higher the household income the more likely the respondents will adopt relevant mitigation measures.

4. Socio-economic status in terms of education and income is positively associated with the capacity of accessing information, therefore the higher the respondent's education and household income the more likely he/she will report the application process as convenient.

5. Socio-economic status in terms of education and income is positively associated with respondent's concerns for risk management; therefore the higher the respondent's education and household income the more likely he/she will consider a designated agency responsible for disaster management as necessary.

3. BACKGROUND

The 1999 Chi-Chi earthquake occurred on the day of 21 September in Chi-Chi Town, Nan-Tau County, Taiwan, which also named as the 9/21 earthquake, had a magnitude of 7.3 on the Richter

scale. Although the tremendous impact of this major earthquake was nation-wide, Nan-Tau County and Tai-Chung County were especially hard-hit by the earthquake. In total, the earthquake killed 2,417 people, and caused 11,305 injuries. In addition, 10,366 housing units collapsed and another 14,720 damaged due to the earthquake (9/21 Earthquake Post-Disaster Recovery Commission, 2003). The overall economic loss incurred by the earthquake reached a total of \$11.5 billion in 1999's US dollars.

On an international scale, the comparative statistics for the 1994 Northridge earthquake in the U.S. is as follows (Wu and Lindell, 2004): its impact reached a magnitude of 6.7 on the Richter scale; it killed 57 people and caused approximately 7,000 injuries. Moreover, there were 13,575 housing units severely damaged and another 37,711 buildings moderately damaged. In total, the Northridge earthquake caused approximately \$25 billion economic loss.

3.1 The research site

According to the classification by National Civilian Confederation of Post-Disaster Reconstruction, based on the severity of damage, there were four types of disaster-stricken areas after the earthquake, the medium-damaged area, the medium-to-heavy damaged area, the heavy-damaged area, and the extreme-damaged area. The epicentre area of Chi-Chi Town was classified as the heavy-damaged area; and the research site of this study, Tzu-Shan Town, was classified as the medium-to-heavy damaged area. Because recovery process varied dramatically in different types of settlements, Tzu-Shan Town was chosen as the research site since it has wide variations of settlement types including town settlements and villages of low and high latitude.

Figure 1 about here

Tzu-Shan Town was located to the southwest part of the epicentre in Chi-Chi Town, Nan-Tau County, as Figure 1 shown both Chi-Chi Town and Tzu-Shan Town were located on the Tze-Long-Pu earthquake fault line. There were approximately 16000 households in Tzu-Shan Town, after the earthquake 2,686 housing units collapsed, another 2,984 buildings were severely damaged, and 121 people were killed by the earthquake. In addition to the casualties and properties loss, the economy in Tzu-Shan Town was devastated by the earthquake, public infrastructure was severely damaged. The situation was even worse in the mountain villages and agriculture settlements, the geography of these areas were significantly impacted by the earthquake, and the high incidence of landslides had made the transportation of these areas very difficult, which

constituted one of the major challenges of reconstruction in these areas (Yeh et al, 2002).

3.2 Data collection

Data for this study were collected from 4 August to 17 August in 2002, approximately three years after the 21 September Chi-Chi earthquake occurred in 1999 (see Yeh et al, 2002 for details of data collection). A face-to-face interview survey was chosen because of the in-depth recovery information required in the questionnaire. A stratified random sampling is adopted in the study area of Tzu-Shan Town, Nan-Tau County based on two factors, the severity of damage (ranging from slight, medium, to severe damage) and the type of settlement (including town settlement, low-latitude village, and high-latitude village). A sample of 2,552 households was drawn from the study area, yielding 1,252 responses, with an overall response rate of 49.05%.

4. RESULTS

4.1 Basic characteristics of households

It seems that the distribution of length of stay in the community had two modes, for example 36% of respondents reported that the head of their household (defined as the breadwinner) had resided in the community for more than 50 years; another 24% reported that the head of their household had resided in the community for less than 10 years. With respect to the social connection of the householder, about 43% householders had participated activities of community organizations, and among those who participated 57.4% of them were not members of any organization; and only 33% of them were members of one organization. Among those who were members of any organization, about 55% householders were cadres of the organization, and only 27% householders as cadres were very active in the organization.

Specific to family structure, about 44% of the households were two-generation families, 27% of the households were one-generation families, another 27% were three-generation families, and only 1% of them were four-generation families. A huge majority of the surveyed households (97%) were residents of the Tzu-Shan Town when the earthquake occurred in 1999. In addition, approximately 40% surveyed households' housing units collapsed or severely damaged due to the earthquake. Another 13% households reported that after the earthquake the households faced economic crisis due to ill health of family members.

Results of the survey also indicate that over 90% of the surveyed households were acquaintance of

community officers, about 43% of them were acquaintance of community cadres. However, relatively few surveyed households were acquaintance of legislators or government officials, for example, while 27% households knew county representatives and 30% households knew town officials; only 14% of them knew central legislators and even much fewer of them (5.6%) known officials of the central government.

The survey further asked the respondents whether government officials and assembly representatives were helpful to them after the earthquake; about 35% respondents reported that community officers were helpful to them, followed by community cadres (15%), town representatives (9.2%), and town officials (7.1%). Moreover, the survey probed, among the households that knew any officials or representatives, to what extent they knew each other and whether the households were relatives of either one of them. The results of this study indicate that over 75% of them were close acquaintance of community officers, followed by town officials (67%), town representatives (61%), community cadres (60%), and only 49% were close acquaintance of central government officials. In addition, 9.5% of them were relatives of community officers, followed by central government officials (8.9%). The respondent's profile of social connection shows that in Taiwan community officers play a significant role during recovery period.

4.2 Major problems respondents faced before and after the earthquake

Before the earthquake about 46% respondents did not have any major problems in their lives; however, after the earthquake the statistics declined to 20%, this indicates the earthquake had substantial negative impacts on the livelihood of the respondents. Before the earthquake the most severe problems respondents had was economics, followed by employment. One month after the earthquake, the most critical problem respondents faced was housing, thereafter the most severe problems became economics and employment, with their percentages much higher than that before the earthquake. This is consistent with the fact that Tzu-Shan Town's economy was already down before the earthquake, and its economy became even worse after the earthquake.

4.3 Experience with past disasters and perceptions of vulnerability to future disasters

About 63% of the respondents indicated that they were not victims of any disasters during the ten years before the earthquake; nevertheless, such statistics declined to 32%. During the ten years

before the earthquake, victims of typhoon had the highest percentage (27.1%), followed by victims of flood (14.6%). After the earthquake, victims of earthquake had the highest percentage (55%), followed by victims of typhoon (31%).

The survey also asked respondents ten years from now what type of disaster is most likely to cause major threats to their lives and properties, 54% of respondents replied that earthquake is the top threat to them, followed by typhoon (26.8%) and flood (9.6%). Despite the substantial island-wide impacts of the earthquake, the most frequent disasters respondents faced are typhoon and flood.

4.4 Assessment of living status before and after the earthquake

Figure 2 displays respondent's assessment of living status before and after the earthquake, and Figure 3 displays respondent's assessment of recovery prospect. In terms of housing status, before the earthquake about 40% respondents reported their housing was in good conditions, the percentage drop to 21%, in contrast, before the earthquake only 4.5% respondents indicated their housing was in poor conditions, after the earthquake the percentage rose to 24.9%. However, as shown in Figure 3, a majority of 60% respondents were still optimistic about the prospect of housing reconstruction.

Figure 2 and 3 about here

Before the earthquake about 23% respondents reported that their household income was in good standing, the percentage decreased to 7.6%, on the other hand, before the earthquake only 15.1% respondents reported their household income was in poor standing, after the earthquake similar statistics dramatically rose to 59.2%, a difference of 44%. It is not surprising that only 38% respondents were still optimistic about the recovery prospect of their household income. The situation of employment is similar to that of household income. Figure 2 indicates that before the earthquake about 26% respondents replied that they had good employment status, the percentage declined to 8.2% after the earthquake. On the other hand, before the earthquake only 17.3% respondents reported they had poor employment status, after the earthquake the statistics significantly jumped to 57.3%, a difference of 40%. Figure 3 also indicates that only 36% respondents were still optimistic about their employment prospect.

With respect to social network, more than half respondents (55%) reported they had good relations with their friends and relatives, the percentage drop to 43% after the earthquake; on the other hand, before the earthquake very few respondents (4.1%)

reported they had poor relations with their friends and relatives, the statistics increased to 13.8%. However, a majority of 75% respondents were still optimistic about the prospect of their social relations as shown in Figure 3.

This study also asked respondents to give an overall rating of their living status; Figure 2 indicates that before the earthquake about 35% respondents considered their general living status was in good conditions, the percentage drop to 15.3%. On the other hand, before the earthquake only 6.4% respondents reported their general living status was in poor standing, the percentage increased to 31.3%. As a whole, more than half respondents (51.1%) were still optimistic about their future prospect of general living status.

4.5 Perceptions about the purchase of earthquake insurance and public mitigation measures

To examine the respondent's willingness to purchase earthquake insurance, the survey asked the respondent the following question: "Are you willing to purchase earthquake insurance given that it is available?" Only 36.5% of them reported that they wanted to purchase it. To test the research hypothesis that the experience of past disaster should enhance respondent's risk perception, and therefore increase their likelihood of purchasing earthquake insurance.

Table 1 Willingness to purchase earthquake insurance

	Yes (%)	No (%)	χ^2	P-value
Victim	40.9	59.1	6.527	0.012*
Non-victim	33.6	66.4		
Elementary school	25.4	74.6	54.59	0.000***
Primary School	42.6	57.4		
High school Over	48.0	52.0		
\$10,000 less	23.4	76.6	48.66	0.000***
\$10,001 ~\$30,000	27.8	61.2		
\$30,000 over	38.8	51.7		

Note: sample size n=1252
* p<0.05; ** p<0.01; *** p<0.001

Table 1 reports the statistical analysis of respondent's belief about the adoption of mitigation measures, the results indicate that victims (40.9%) had higher percentage than non-victims (33.6%) to purchase earthquake insurance, with χ^2 (6.527) significant at 0.05 level. In addition, Table 1 shows

that the higher the respondent's education and household income, the more likely he/she will purchase earthquake insurance, the results are highly significant at 0.001 α level.

Furthermore, when the survey asked the respondents "Which agency do you think should provide earthquake insurance?" as high as 72.6% of them expressed that central government should provide the earthquake insurance, followed by private insurance sector (16.7%) and local government (10.7%). Part of the reasons why respondents had higher expectations toward central government and private insurance sector than local government in providing the earthquake insurance is probably due to the fact that Taiwan is a highly centralized nation, most local governments, except Taipei City, have relatively poor infrastructures and resources to implement any major socio-economic policies.

Table 2 Which agency do you think should provide earthquake insurance?

	Central Gov (%)	Local Gov (%)	Private insurance (%)	χ^2	P-value
Victim	78.5	8.2	13.4	10.694	0.005**
Non-victim	68.6	12.4	19.0		
Elementary school	78.2	8.8	13.0	10.645	0.031*
Primary School	67.9	14.3	17.9		
High school Over	70.5	10.1	19.3		
\$10,000 less	74.5	13.8	11.7	15.519	0.004**
\$10,001 ~\$30,000	76.5	8.2	15.2		
\$30,000 over	66.8	11.3	21.9		

Note: sample size n=1252
* p<0.05; ** p<0.01; *** p<0.001

The results of Table 2 show that victims (78.5%) are more likely than non-victims (68.6%) to express the view that central government should provide earthquake insurance. Table 2 also indicated that respondents with the least schooling (78.2%) had the highest percentage of considering central government should provide earthquake insurance; respondents with primary education (14.3%) have relatively higher percentage to express that local government should take the lead in providing the insurance; while respondents with high school education or more (19.3%) had relatively higher percentage to express the view that private insurance sector should provide the insurance.

Table 2 shows that respondents in the highest income group were more likely to consider private

insurance sector to provide the insurance (21.9%), and were less likely to consider central government to assume the same role (66.8%) compared to the other two income groups. It seems that respondents in the higher socio-economic strata tend to leave the provision of earthquake insurance to market mechanism instead of government; whereas respondents in the lower strata tend to have higher expectation toward government in providing the earthquake insurance.

The survey also asked the following question to investigate respondent's willingness to pay for public mitigation measures: "During disaster period are you willing to pay extra money on public facilities in order to maintain normal functioning?" About 46.7% respondents were willing to pay extra money on public facilities to mitigate disaster, about 10% higher than that for the willingness to purchase earthquake insurance.

Table 3 Willingness to pay for public infrastructure to maintain operations during disaster period?

	Yes (%)	No (%)	χ^2	P-value
Victim	48.4	51.6	0.854	0.376
Non-victim	45.7	54.3		
Elementary school	38.3	61.7	29.382	0.000***
Primary school	50.7	49.3		
High school over	55.6	44.4		
\$10,000 less	36.6	63.4	32.326	0.000***
\$10,001~\$30,000	46.4	53.6		
\$30,000 over	57.7	42.3		

Note: sample size n=1252
* p<0.05; ** p<0.01; *** p<0.001

The analysis displayed in Table 3 shows that regardless of the experience of past disaster, victims and non-victims were equally likely to agree to pay extra money to maintain public facilities during disaster period (P-value of $\chi^2 = 0.376$). Results in Table 3 confirmed the hypothesis that respondents with higher education tend to have stronger risk perception, which should make them more likely to agree to pay for public mitigation facilities. Moreover, respondents with highest household income had the highest percentage (57.7%) of willingness to pay for public facilities during disaster period; this indicates that willingness to pay for public mitigation measures is strongly associated with respondent's ability to pay, which is consistent with the hypothesis.

In a nutshell, the implication of the above findings has threefold: first, in spite of the perception of disaster threats, a majority of respondents are not willing to bear the financial burden of relevant mitigation measures. Second, when financial

burden of mitigation became necessary, the respondents are more willing to pay for short-term, urgent mitigation measures (e.g. public facilities) than long-term, sustainable mitigation measures (e.g. earthquake insurance). Third, most respondents considered central government, instead of local government, should assume the role of providing earthquake insurance.

4.6 Effectiveness of help from various sectors after the earthquake

The survey asked the respondents to evaluate the effectiveness of help from various sectors after the earthquake, more than 60% of respondents reported that governments (including central, county, and town levels) and NGO's were not helpful to them; and 57.5% of them expressed that friends and relatives, among other sectors, were helpful to them. Furthermore, the survey asked the respondents to compare the effectiveness of help from various sectors, a majority of them (84.5%) indicated that self help was most helpful to them, followed by friends and relatives (9.7%), government sectors (3.3%), and NGO's (2.4%). The above findings show that after the earthquake most respondents relied on themselves to recover, among the help from outside, informal social networks such as friends and relatives played a significant role. Among the help from government sectors, community officers were most helpful to the respondents, followed by central government, county government, and town office.

Table 4 After the earthquake the most helpful sector to you?

	Gov (%)	NGO (%)	Friends/relatives (%)	Self-help (%)	χ^2	P-value
Victim	6.5	2.0	12.8	78.6	37.418	0.000***
Non-Victim	1.2	2.7	7.5	88.6		
Elementary school	3.5	2.0	10.4	84.2	2.909	0.820
Primary School	3.4	2.6	7.5	86.6		
High school over	3.3	3.0	10.1	83.6		
\$10,000 Less	4.0	1.6	11.5	82.8	8.364	0.213
\$10,001-\$30,000	3.8	2.2	10.2	83.8		
\$30,001 over	1.9	3.3	7.8	86.9		

Note: sample size n=1252

* p<0.05; ** p<0.01; *** p<0.001

Table 4 tests if effectiveness of help from various sectors differs by victim status, the results show that although most respondents relied on self-help during recovery period, victims had relatively higher percentage than non-victims that considered government agencies (6.5% vs 1.2%) and friends and relatives (12.8% vs 7.5%) were most helpful to

them; however, non-victims had relatively higher percentage than victims (88.6% vs 78.6%) that considered self-help as most effective to them, such differences are highly significant at 0.001 level.

Table 4 also examines socio-economic variations of effectiveness of help from various sectors after the earthquake. The analysis shows that effectiveness of help from different sectors did not differ by education or income groups, which is a good sign that there were no significant socio-economic variations in terms of effectiveness of help respondents received from different sectors.

The survey asked the respondents the following question: "If another natural disaster occurs in the future, which sector do you feel confident that will provide sufficient help to you?" About 78% respondents replied that they are confident in friends and relatives, followed by NGO's (70%) and governments (46%).

4.7 General beliefs and opinions about the applications for disaster assistance

To evaluate the accessibility of disaster assistance, the survey asked the following question: "After the earthquake were the applications for disaster assistance convenient to you?" Approximately 40% of respondents considered the application process convenient to them; the results indicate that the applications for disaster assistance were not convenient to most victims.

Table 5 Are the applications for disaster assistance convenient to the public?

	Convenient (%)	Not convenient (%)	χ^2	P-value
Victim	48.4	51.6	27.110	0.000***
Non-victim	30.8	69.2		
Elementary school	40.9	59.1	2.581	0.275
Primary school	35.4	64.6		
High school	42.7	57.3		
\$10,000 less	40.3	59.7	5.671	0.059
\$10,001-\$30,000	35.5	64.5		
\$30,001 over	45.5	54.5		

Note: sample size n=1252

* p<0.05; ** p<0.01; *** p<0.001

Table 5 displays convenience of assistance applications by victim status, education and household income. The results indicate that although the majority of victims and non-victims considered the assistance applications inconvenient, victims did have relatively higher proportion than

non-victims in considering the applications convenient (48.4% vs 30.8%), such differences are highly significant at 0.001 level.

The underlying explanations for such differences are twofold: first, it may be due to the fact that those who had experienced the application process and were qualified as victims for disaster assistance tend to have positive evaluations of application process. Second, it is possible that after the earthquake a substantial proportion of people in the disaster-stricken area had tremendous loss but their applications for assistance were declined, such experience tend to result in negative evaluations toward the application process. Therefore there may be a selection process toward the evaluations of application process.

Table 5 also test the hypothesis that respondents with higher education and/or household income tend to be well-informed in terms of assistance application process, and therefore are more likely to consider the application process as convenient. The evidence in Table 5 does not support the hypothesis; respondent's evaluation of application process does not vary with education or income groups.

4.8 Necessity of a designated agency responsible for disaster management

When asking the respondents the following question: "After the earthquake do you think it is necessary to establish a special agency to take charge in disaster response and resource allocation?" about 82% of respondents reported that it is necessary to do so.

Table 6 Is it necessary to establish a special agency to take charge in disaster response and resource allocation?

	Nece-ssary	Not Nece-ssary	χ^2	P-value
Victim	84.8	15.2	2.913	0.051
Non-victim	80.9	19.1		
Elementary school	76.0	24.0	24.241	0.000***
Primary school	87.4	12.6		
High school	86.8	13.2		
\$10,000 less	76.9	23.1	13.005	0.001**
\$10,001~\$30,000	83.7	16.3		
\$30,001 over	86.9	13.1		

Note: sample size n=1252

* p<0.05; ** p<0.01; *** p<0.001

Table 6 tests the hypothesis that the experience of disaster should make victims more likely to consider a designated agency responsible for disaster management as necessary. The evidence from Table 6 does not support the hypothesis; victims were no more likely than non-victims to consider the designated agency as necessary.

However, results of Table 6 provide the evidence that respondent of higher socio-economic status, in terms of education and household income, tends to be positive about the designation of a special agency for disaster management, such variations are highly significant.

To further explore respondent's views about which actor or sector should take the lead in promoting post-disaster recovery, 24% of respondents reported that central government should take the major role of promoting recovery, followed by county government (12.8%), community-based organizations (CBO's, 11.7%), and town office (11.3%).

Table 7 about here

Table 7 examines whether respondent's views about which actor or sector should take the lead in promoting recovery vary by victim status or socio-economic status. The results show no significant differences between victims and non-victims on such views. However, the evidence shows that respondents of higher education and household income tend to prefer CBO's, NGO's, scholars & experts, and local government at the county and town levels to take the lead in promoting recovery; whereas respondents of lower education and household income tend to prefer central government and community officers to take the lead on recovery. Such socio-economic variations are highly significant at 0.001 α level for both education and income groups.

5. CONCLUSION AND POLICY RECOMMENDATIONS

The analysis of this study indicates that before the earthquake the residents of Tzu-Shan Town already faced two serious problems in economics and employment; and the earthquake made the situation even worse for the residents of Tzu-Shan Town. To effectively solve the two major problems, policies of recovery have to boost the economy of Tzu-Shan Town. The results of this study are consistent with the findings of Chou and Cheng (2002), which investigated victim's needs in nation-wide seismic areas and found top priority recovery agendas included housing loan programmes, employment services, job training, economy prospect, public

infrastructure, and mitigation measures of landslides.

Findings of this study show that only 37% respondents were willing to purchase earthquake insurance, and less than half respondents (47%) were willing to pay extra money to maintain public facilities during disaster period. Further analysis indicates that the willingness to purchase earthquake insurance and to pay for public facilities during disaster period is positively associated with education and income. Most people also reported that central government instead of local government should provide earthquake insurance, this is not surprising given that central government in Taiwan has been holding most of the political resources in the past five decades. These findings imply that to integrate mitigation measures into future recovery policies central government should provide subsidies and/or economic incentives to the disadvantaged social groups on the adoption of mitigation measures.

In terms of social resources, as high as 84.5% respondents indicated that self-help was most helpful to them after the earthquake, followed by friends and relatives (9.7%); whereas government agencies and NGO's had provided only limited help. Among various levels of government agencies, community officers were most helpful to the respondents, and in general central government agencies were more helpful than local ones. Future policies of recovery should utilize the positive function of community officers in distributing relevant information about reconstruction to facilitate recovery implementation.

Regarding the applications for disaster assistance, only 40% respondents considered the application process was convenient to them. A strong consensus among the respondents (82%) indicated that it was necessary to establish a designated agency to take charge in disaster management and resource allocation. Most respondents also considered central government should take the lead to promote recovery. Further analysis also indicates that socio-economic status, in terms of education and income, is positively associated with the agreement on a designated agency of disaster management.

Specific to the functional division of labour between public and private sectors during recovery period, most respondents considered central government should focus on policy planning and resource allocation; local government including county and town levels should emphasize on policy implementation; community officers should perform their job in distributing policy information. In addition, outside NGO's should facilitate policy

implementation; whereas local CBOs should play their roles in participation and provide policy recommendations. Moreover, local community residents should organize themselves to promote recovery; and scholars/experts should participate in the planning and implementation of recovery policies.

This study provides the following recommendations for future research agenda and recovery policies. First, it is essential to collect nation-wide dynamic panel samples of residents in the disaster areas. In spite of the various cross-sectional surveys conducted after the earthquake, most of them were not compatible to each other in terms of research agenda and questionnaire items; and therefore the results of them were not comparative to each other, which made it even more difficult to reach firm conclusions.

Second, the majority of the surveys were lack of comprehensive information about respondent's social network and social resources, which were crucial factors during the period of recovery. Post-disaster recovery would be a long term process (Shaw and Goda, 2004); future surveys should collect longitudinal information that covers comprehensive socio-economic aspects of the respondents. Such surveys can provide useful empirical basis of policies planning.

Third, policymakers need to overcome the myth of recovery back to pre-disaster normal status. Past research of disaster recovery has questioned the legitimacy of such policy myth, since normal status in the disaster-stricken areas were often characterized with poverty and vulnerability to environmental hazards (Mustafa, 2003), and the restoration of damaged areas back to pre-impact status tended to reproduce victim's vulnerabilities to disaster (Schwab et al., 1998).

The in-depth interview findings of this study provide evidence of caveats of this policy myth. After the earthquake various socially disadvantaged groups have been exposed to the public; however, most recovery policies were designed to restore victim's properties to pre-disaster status. As a result, recovery policies were unreachable to victims who owned virtually no properties before the earthquake. This is consistent with past research that criticized many disaster-assistance programmes often neglected the needs of the most vulnerable victims (Bolin and Stanford, 1998; Comerio, 1998).

The reason why recovery policies should include "latent" victims as target population has threefold, one is that it is difficult to objectively identify if target population's outcome was truly affected by the disaster. Another reason is that observable

victims were often those who had properties to lose during the disaster; the policies therefore tend to neglect those victims who had no observable properties. Moreover, the “latent” victims should have been the target population of social assistance policies during normal times; they entitled the help from the government during normal times, not to mention after the disaster their life chances were even worse compared to normal times. To judge victims only based on the loss of observable properties would seriously violate the principle of social justice. Future recovery policies should overcome the myth of “recovery to normal status”, the target population of recovery policies should include both “observable” victims as well as “latent” victims, and to prevent the “latent” victims from being trapped in long-term poverty.

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Table 7 Which sector do you think is most appropriate to promote reconstruction after the earthquake?

	CBO (%)	NGO (%)	County Gov.(%)	Town office (%)	Community Officer (%)	Central Gov.(%)	Scholars/experts (%)	Other (%)	χ^2	P-value
Victim	11.7	5.7	12.6	11.5	7.5	23.7	2.3	24.9	6.551	0.477
Non-victim	11.6	6.9	12.9	11.1	6.0	24.2	4.6	22.7		
Elementary school	8.8	3.6	11.5	8.8	7.0	25.8	1.9	32.7	82.698	0.000***
Primary school	11.8	8.4	14.1	12.9	6.5	27.8	3.4	15.2		
High school	15.6	8.9	14.0	13.8	6.1	18.9	6.4	16.3		
\$10,000 less	8.8	2.8	10.5	8.0	8.8	29.5	1.1	30.6	86.889	0.000***
\$10,001 ~30,000	12.4	5.5	13.4	9.4	5.8	24.2	4.4	24.9		
\$30,001 over	11.6	6.1	13.1	11.4	6.8	24.3	3.8	23.0		

Note: sample size n=1252

* p<0.05; ** p<0.01; *** p<0.001

Figure 1 Map of Research Site- Tzu-Shan Town, Taiwan

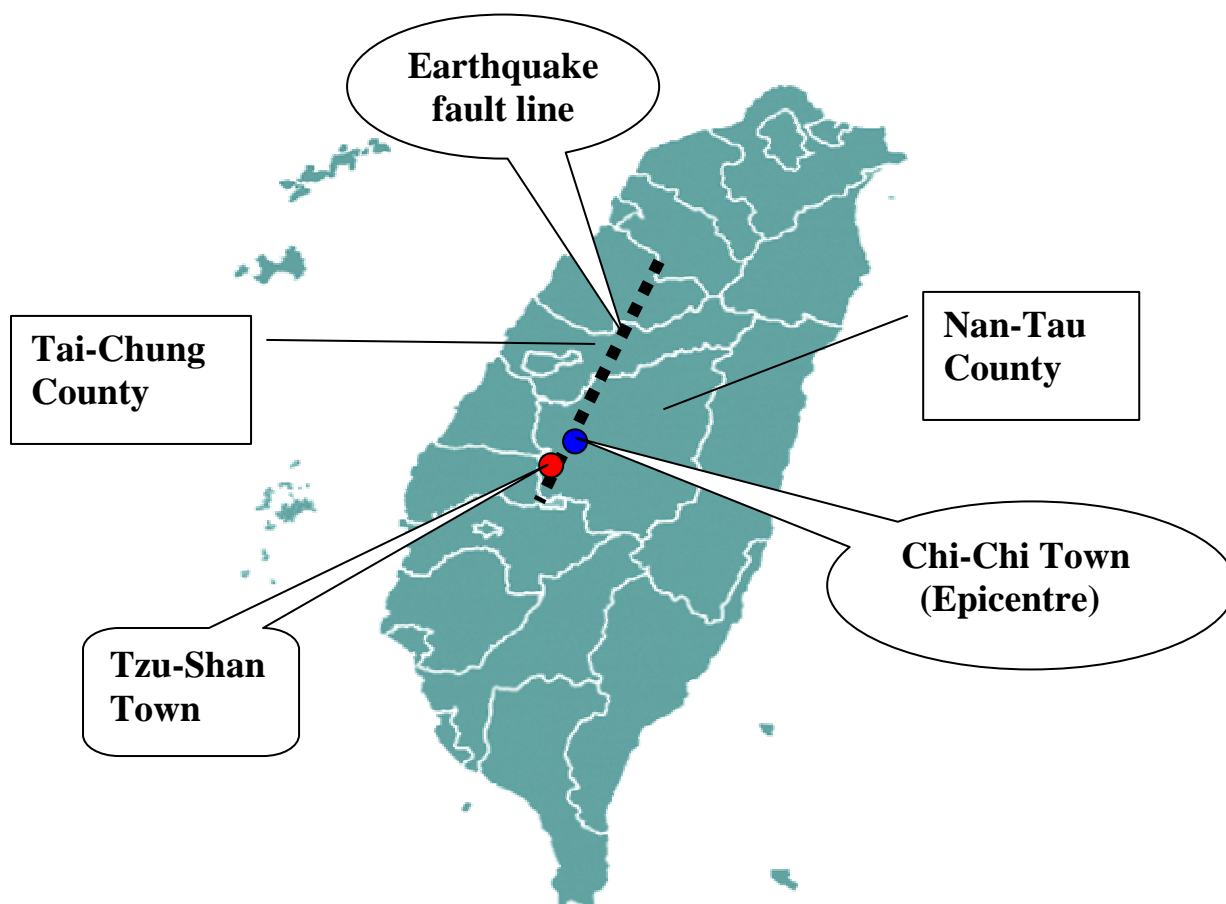


Figure 2: Assessment of living status before and after the earthquake

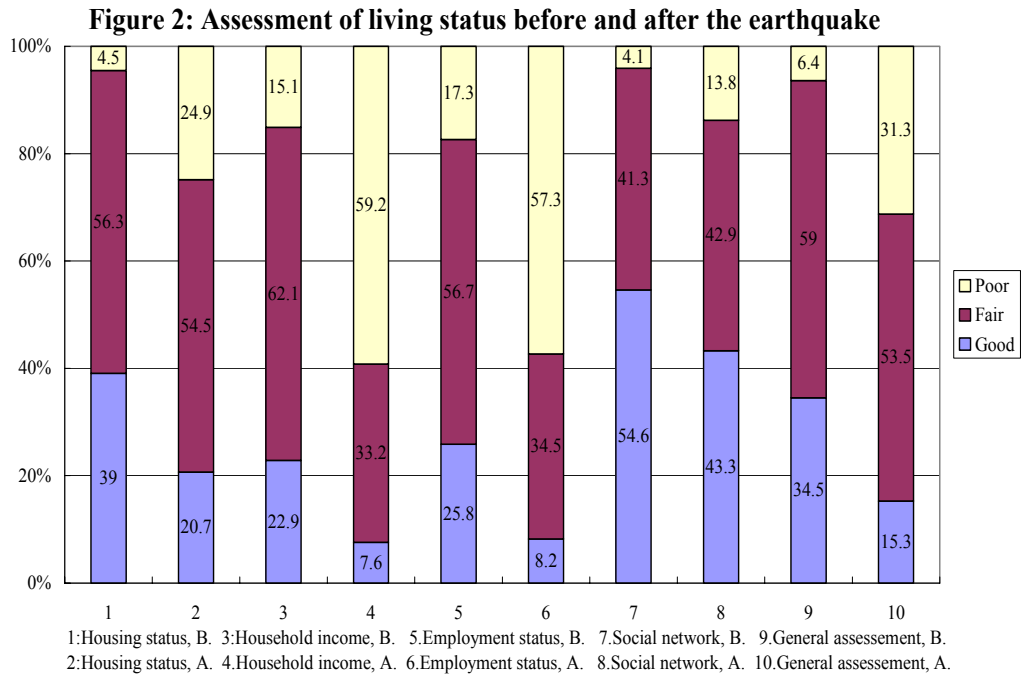


Figure 3: Assessment of the prospect of recovery

