Institutional and Local Responses to the 2011 Tohoku Disaster: Social Capital and Recovery

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Research Question: To what extent have levels of social capital among Japanese rural communities had a differential impact on personal, psychological, and financial recovery from the earthquake, tsunami and nuclear disasters? More specifically, what factors have created wide variations in casualty, survival and evacuation rates among the cities and villages in the Tohoku region?

Methodology: As a pilot trip, the goal of this week of research was to build connections with local organizers to facilitate future large-N research surveys and to collect initial data on conditions throughout the Tohoku region. I traveled to small communities in the northeastern Japanese prefectures of Iwate and Miyagi with a team of social scientists from the United States, Taiwan, and Korea to meet with local residents, NGO leaders, bureaucrats, and disaster managers under the auspices of the Earthquake Engineering Research Institute (EERI, based in California) and the Institute for Social Safety Science (ISSS, based in Japan). During this period I was able to collect anecdotes from a broad range of individuals (survivors and managers alike) along with some basic data on survival and casualty rates. Through conversations with informants I have generated potential explanations for the variance in survival rates, but confirming these hypotheses will require a much larger sample.

Research Findings and Applications: As of mid summer 2011, the Japanese National Policy Agency (*Keisatsu chō*, NPA) stated that more than 22,000 residents in the Tohoku region lost their lives in the 3 March 2011 tsunami (see http://www.npa.go.jp/archive/keibi/biki/higaijokyo_e.pdf for specific numbers as of late

June). Interestingly, perhaps due to the offshore nature of the earthquake in combination with high standards for building construction, there was little evidence of deaths due to the earthquake itself. The damage from the wave – which reached as high as 10 meters in some areas - was especially concentrated in the northeastern prefectures of Miyagi and Iwate, with some additional deaths in Fukushima, Ibaraki, and Chiba prefectures.

In terms of raw numbers, casualties resulting directly from the wave varied tremendously by location. In Ishinomaki City, for example, more than 3100 people were confirmed dead, with an additional 2770 missing (out of a total population of 162,000); in the village of Matsushima in Miyagi Prefecture, only 2 died, with 1 person missing (out of 16,000 or so residents). In Miyako City's Taro district, 192 people are dead or missing, out of 4400; in Minami Sanriku village, out of 17800 people, 1140 or so are dead or missing. Converted to percentage, the variation becomes clearer, as Table 1 below demonstrates.

Table 1: Examples of Casualties as Raw Numbers and Percentages of Total Population

Town / city / village	Number of casualties	As percentage of population
Ishinomaki City	5870	3.6
Matsushima Village	3	.01
Taro District, Miyako City	192	4.3
Minami Sanriku Village	1140	6.4

Within these five coastal locations – all deeply affected by the wave – the percentage of the population which perished or went missing in the tsunami is between .01 and more than 6 percent. Given this variation, the pressing question for social scientists and observers to answer should be reasons for the tremendous differences across localities.

Working with the information from Japanese contacts, I believe that potential explanations for differences can be categorized into two main areas: *technocratic* and *human factors*. Technocratic factors include geography and topology and distance to shelter, while human factors include limited mobility, care giving, inaccurate conclusions drawn from past tsunami experiences, and the instinct to protect property.

In some villages, the shape of the bay or port along with its depth channeled the wave deeply inland and increased its height. Fishermen explained that, where the water depth was lower, the tsunami actually was higher than in deeper water areas. In other localities, due to a more southward facing opening, ports escaped with less damage (as the energy from the tsunami came primarily from the northwest towards the northeast). Other technocratic reasons for higher casualty rates include larger plains areas with more houses where the distance to higher, safe ground was longer and the gradient steeper.

Human factors, however, were cited by many of my informants as the core reasons for deaths. Many of the casualties were elderly – with a mean age in the lower 60s – and hence less mobile, less able to hear warnings (via cell phone, radio, television, short wave bands and through local sirens), and less able to easily evacuate to higher ground. One resident told us that loading his elderly and often bedridden mother into a car could take more than an hour; most towns had roughly 30 minutes between the tsunami warning and the arrival of the wave. That elderly and infirm are more vulnerable to disaster is a well established fact from innumerable disasters, and the Tohoku tsunami was no exception. Members of the Japanese Self Defense Forces, for example, discovered that close to 130 elderly patients had died at a Fukushima hospital, evidently abandoned by their

caregivers (see http://www.guardian.co.uk/world/2011/mar/17/japanese-earthquake-toll-ageing-population-deaths).

However, other victims of the disaster who were mobile and heard the warning also perished due to their selflessness. Some may have perished when they returned to homes to take care of elderly or infirm family members; this was a common narrative among many decision makers.

In other communities, additional human factors played a role in decision making. In the village of Kessenuma, for example, members of the Minami *shotengai* (business owners association) argued that the vast majority of local residents successfully escaped to high ground, while the three who perished did so because they did not believe that the wave would come, and that they did not want to leave. In other communities, experience with the 22 May 1960 Chilean tsunami (which reached Japan some 15 hours after the initial earthquake in South America) may have lead to inaccurate conclusions about this tsunami. Specifically, a number of towns and villages erected markers indicating the maximum height from this earlier disaster, and residents may have believed that the wave would not go beyond these artificial boundaries.

Another category of deaths caused by human factors includes property protection. Victims may have heard the warnings but believed that they had enough time to return to their homes to pick up money (as many Japanese residents store large sums of money at home, as opposed to savings accounts), invaluable person artifacts, or pets.

Understanding which of these explanations – if any – best account for the variation in deaths across localities is critical for creating more effective public policies both in the United States and in Japan. If, for example, technocratic reasons, such as gradient and

distance to shelter, account for many deaths, decision makers should work on creating more shelters in place (as we saw in one coastal city where three people survived on the top tier of a beachfront cement building built as a vertical evacuation shelter). Alternatively, if human factors are responsible, decision makers around the world should create more mandatory evacuation drills, dissemination of information, and new procedures to better evacuate the elderly and infirm. The town of Portland, Oregon, for example, has taken the experiences in Japan quite seriously and is beginning to develop tsunami mitigation and recovery plans.

Future Research Agenda: The outstanding question of what explains the broad variance in survival rates from the tsunami should be tackled by scholars both in Japan and abroad. Researchers should now begin focused interviews with the families, friends, and neighbors of those who perished to begin creating a record of the causes of death for these victims. Through large scale surveys, face to face interviews, and (with permission) analysis of the phone and internet logs of those who perished will yield information that will be tremendously beneficial to mitigation and protection from disaster in the future. Such knowledge will be invaluable in preventing future deaths and in building future public policies which can enhance safety and survivability. I am very grateful to the Natural Hazards center for allowing me to begin this research through a week in Japan, and look forward to reporting on the results of my investigation as I use these pilot study results to apply for larger institutional grants.