Abstract

Based on the experience of disaster and implementation of housing recovery, many countries have modified their temporary housing policies for subsequent disasters. By comparing the policies and how they affect the implementation process in countries with different socio-economic backgrounds (Japan, the U.S., Taiwan, Indonesia, and New Zealand) the authors found some commonalities as well as differences that may be useful to consider improvements for the role of temporary housing in the post-disaster recovery process.

Introduction

The temporary housing phase plays a critical role in the housing recovery process, which varies by country. Post-disaster housing policies often change significantly after a major disaster. By comparing revisions of post-disaster housing policies and implementation from several countries, this research considers the effect on the recovery process and commonalities of factors that emerge in the innovative changes in temporary housing support.

Japan

With a history of repeated natural disasters, the role of temporary housing in Japan is well established within the housing recovery process, and the size, length of use, funding and procurement are specified by the Disaster Relief Act. Temporary Housing is typically 29.7 m², intended for two years use at building cost of 2,433,000 yen per unit, though time and cost often exceeds these limits.

1995 Great Hanshin-Awaji Earthquake

After the 1995 Great Hanshin-Awaji Earthquake in Kobe, which killed 6,434 and damaged 639,686 houses, the government provided 49,681 mostly pre-fabricated temporary housing units. Due to land availability, many were situated in inconvenient suburban areas far from original communities and the negative impact of scattering vulnerable residents and the poor living environment in temporary housing are well known lessons from Kobe. [1] The Disaster Relief Act didn’t include the right of temporary housing for all, however an amendment issued after the earthquake guaranteed any disaster-affected person who wished would be provided temporary housing with only a monthly utility fee. To ensure rapid provision of temporary housing, all 47 prefectures signed agreements with Prekyo, Japan Prefabricated Construction Suppliers and Manufacturers Association, which became a primary temporary housing provider.
2011 Great East Japan Earthquake

The 2011 Great East Japan Earthquake and tsunami killed 18,498 and damaged 400,438 houses, displaced nearly 470,000 people at its peak and caused a massive need for housing. [2] The government provided 121,850 units of temporary housing including 68,334 existing rental apartment units, an even larger number than 52,000 newly built temporary housing units. This is a significant change compared to the mere 139 existing apartments used as temporary housing after the Kobe Earthquake.[3] Despite agreements, Prekyo could not supply the needed amount, which resulted in an opportunity for local carpenters to build temporary housing; 9,000 temporary housing units were built by local contractors using locally available materials, thanks in part to pre-existing organizations promoting local timber and carpentry. Among the factors that supported these changes, the context of Japan’s aging society and decreasing population and increasing stock of vacant apartments played a role. Changes in the years following great disasters in the way of providing post disaster housing in Japan have contributed to progress towards a smoother transition of life recovery, however emerging issues such as repercussion of financial burdens that come with the changes are a concern. At the same time the positive effect of participation of local actors must be recognized as having multiple effects such as revitalizing local economies, reducing industrial waste and disposal costs while opening up horizons for innovative future solutions.

United States

Transitional Shelter Assistance (TSA) is provided by the Federal Emergency Management Agency (FEMA) after a disaster according to the Stafford Act, which regulates all disaster response and recovery in the U.S. TSA support can be in the form of funding for house repairs, hotel rooms, or in-kind temporary housing, such as pre-fabricated housing units or travel trailers, and is available for 18 months, but this time period can be extended. The size of housing units is not specified.

2005 Hurricane Katrina

Making landfall on August 29, 2005, Hurricane Katrina killed 1,863 people and damaged over one million housing units, causing the most destruction of any disaster in U.S. history. FEMA provided Transitional Shelter Assistance in the form of travel trailers and mobile homes, which were placed on individual homeowners’ lots or group lots on government property. The trailer program was strongly criticized for many reasons such as small size, poor quality, use of toxic chemicals, delay in procurement and delivery, and expense.

Alternative Housing Pilot Project and Mississippi Cottages

Two years after Katrina, in response to the recognized failure of the trailers, the Department of Housing and Urban Development (HUD) and FEMA introduced the Alternative Housing Pilot Project (AHPP) with two separate goals: 1) to design better emergency housing that can transition to permanent housing and 2) to provide improved housing to disaster survivors still unable to find permanent housing (many still in FEMA trailers). The largest AHPP project created the Mississippi Cottages, small, prefabricated houses in 3 sizes (462-924 ft²) designed to withstand hurricanes. With similar size and construction cost, they were intended to replace trailers/mobile homes and eventually be transferred to the occupants’ permanent ownership. Within a year in September 2008, more than 2,805 cottages were provided temporarily [4] and by March 2011, the ownership of 1,000 units had been transferred. However many occupants who wanted to keep the cottages permanently were unable to because of difficulties finding land, utility costs, and resistance from local municipalities.
against permanent cottage placement. No direct policy changes emerged from AHPP.

2012 Hurricane Sandy
In October 2012, Superstorm Sandy struck the eastern U.S., with heaviest damage in New York and New Jersey. Both states rejected the use of trailers, although a small number of prefabricated Temporary Housing Units (THUs) were provided by FEMA in New Jersey. New York introduced a voucher programs for hotel rooms and apartments as temporary housing but the lack of available housing made it extremely difficult to use these programs.

Indonesia

2004 Tsunami in Aceh
On December 26, 2004, the Indian Ocean Tsunami caused massive destruction and killed 200,000 people in the region including 120,000 in Aceh. Already suffering years of conflict, tsunami damage created the need for 100,000 houses in Aceh alone. The Indonesian government built barracks as emergency housing, and established a housing reconstruction program to provide a 36 square meter core house for each tsunami-affected family; NGOs and international housing providers also followed the government’s guidelines, and NGOs provided almost 50% of new reconstruction housing in Aceh. [5]

2006 Central Java Earthquake
On May 27 2006, the Central Java Earthquake struck south of Yogyakarta, Indonesia, causing 5,749 deaths and destroying over 1,100,000 houses, mainly in rural villages. Due to a limited budget, the government focused on a plan to rebuild 180,000 permanent houses through a community-based approach. In order to bridge the gap before permanent housing could be provided and prepare for the coming rainy season, local and international shelter providers worked together to carry out a “roof first” strategy providing minimum transitional shelters (T-shelters) made of local lightweight bamboo. Because most people owned their home and land before the earthquake, they could reuse /modify T-shelters on their lots.

2010 Eruption of Mt. Merapi
In October and November 2010, volcanic eruptions of Mt. Merapi, north of Yogyakarta, destroyed 45 villages, killing more than 350 people, and burying/destroying 2682 houses [6]. Government restricted rebuilding in hazard zones, but past relocation attempts on Merapi show the difficulty of encouraging residents to leave. Housing reconstruction used a community- based reconstruction model similar to the 2006 Earthquake, providing funds to groups of 10-15 households, for rebuilding in collective relocation sites or in situ outside the hazard zones. Temporary housing was built by NGOs, the Army and private corporations’ CSR grants; the largest number of temporary housing was provided in collective relocation sites, later used for permanent housing relocation. Within the context of relocation, the challenge of housing recovery was to keep communities together in the recovery process from temporary to permanent housing, and to support economic recovery along with housing.

Taiwan 921 and Typhoon Morakot
On September 21, 1999, the Chi Chi EQ struck central Taiwan, killing close to 2500 people and destroyed 105,000 housing units [7] Residents could chose from several interim options including purchase of public housing, moving into prefabricated temporary housing (which was increased from 25.94 m² to 39.67 m²) or rental assistance, which was selected by 80% [8]. Permanent housing reconstruction relied on several options for loans to support housing repair or reconstruction. In August 2009 Typhoon Morakot caused landslides in southern
Taiwan, killing 699 people and making 1766 housing unlivable [9]. The main housing recovery focus was the relocation of indigenous villages. Most relocated houses were built by NGOs on land provided by the Government, attempting to facilitate quick housing recovery.

**New Zealand**

The post-disaster housing reconstruction system in New Zealand differs from other cases and insurance compensation is used to rebuild or to relocate if the land was in the hazard zone. A unique system of “temporary villages” was introduced, providing prefabricated temporary houses that residents can rent while they build their homes. [10]

**Conclusions**

Post disaster housing reconstruction cases in different countries were discussed to consider how they affect the implementation process of housing recovery or vice versa. Despite diverse conditions, several common drivers for policy change emerged: 1) to improve temporary housing quality; 2) to provide more options and flexibility for residents; and 3) to keep communities together during relocation. Examples of wooden temporary housing by local builders in Japan (vs. to pre-fab units) and the Mississippi Cottages in the U.S. (vs. to trailers) demonstrate ways that higher quality construction can create better living environments, while transitional shelters in Yogyakarta and temporary villages in New Zealand try to ensure continuous support by filling gaps. The tendency to promote the use of existing housing units over new construction was observed in Japan, U.S. and Taiwan, demonstrating that new housing is not the only solution. Based on these findings, further study is needed to create more holistic solutions for post disaster housing reconstruction.

**Acknowledgments**

This research was supported by the JSPS Grants-in-Aid for Scientific Research “International Comparison of Post-Disaster Transitional Housing” (Investigator: Elizabeth Maly)

**References**

1. Fire and Disaster Management Agency, *Hanshin Awaji Daishinsai ni tuite (Kakuteihou)*, 2006.5.19.
8. Ibid.