Housing reconstruction in urban and rural areas
By Zoe Trohanis and Geoffrey Read

Background
The destructive Wenchuan Earthquake of magnitude 8.0 occurred at 2:28 pm local time on 12 May 2008, in the western Sichuan Province of China. The reconstruction of public and private housing emerged as a key issue for the Government of China. This note discusses delivery mechanisms and financing strategies for housing reconstruction, as well as gives examples of recent international experience with post-disaster housing reconstruction programs and key issues for consideration by the government moving forward.

Urban and rural housing reconstruction

Urban housing reconstruction programs are generally more complex and costly to implement as a result of the interim or permanent resettlement of large populations, the need to increase densities in multistory buildings due to shortage of available land, and the need to accommodate complex tenure situations. The ownership and maintenance of multi-tenement structures requires a more comprehensive legal framework and high construction costs for the more complicated and engineered structures. Recovery programs need to incorporate responses to these multiple and varied ownership situations.

Rural housing reconstruction programs, due to the dispersed nature and lower incomes of these types of communities, rely more on simpler technical solutions and self-help skill inputs. This increases the challenge for the government to support and facilitate reconstruction, particularly to achieve some degree of code compliance in order to avoid reconstruction of substandard and seismically vulnerable housing. In addition, damage in rural communities will most likely include damage to simple but essential agricultural and livestock structures, these generally being an...
integral part of houses as well as being vital to livelihood restoration. Damage thus represents a double loss and restoration a double benefit. These specific rural needs and configurations should be addressed as part of reconstruction.

Renters versus owners: While the loss of owner-occupied housing is very significant, the loss of rental housing assets at such a large scale also significantly destabilizes supply in the rental markets, thereby impacting renters. It is usually the poorest members of society who are landless and who are unlikely to have access to immediate shelter relief during the long period of housing reconstruction and until the rental market supply catches up to the demand. It is important to ensure that policies include provisions to address the needs of the rental population.

Based on their particular situation, and the challenges and constraints they face, countries implementing post-disaster reconstruction have used different strategies to undertake housing reconstruction such as homeowner-driven approaches and the use of large-scale contractors. Below are case study examples from India, Pakistan, and Turkey. Annex 1 provides an overview of these and other case study examples.

INTERNATIONAL EXPERIENCE

Gujarat, India: Housing reconstruction
In Gujarat, India following the earthquake in 2001, affected families were given the financial assistance for reconstruction or repair. They themselves organized the process of reconstruction as per their need, pace, and will. Owners of destroyed houses were given reconstruction assistance at specified financial scales, while owners of damaged houses were given repair assistance at differential scales, depending upon the extent of repairs required. Grant payments were made directly into newly opened household bank accounts; 660,000 new bank accounts were opened. Payments were distributed in two to three installments to ensure reconstruction standards compliance with hazard resistance norms.

The policy of providing minimal housing was adopted to ensure that every affected and eligible family would receive at least a minimum safe shelter, even if their home had greater square meters prior to the earthquake. In rural areas, for example, government assistance was limited to the maximum grant amount of RS 90,000 (USD 2,117) required to construct a safe core housing unit of 45 square meters. In urban areas, the core unit was estimated to cost RS 175,000 (USD 4,117) for up to 50 square meters.

The government of Gujarat facilitated the housing reconstruction process by providing technical guidance, ensuring material availability, and organizing technical supervision for constructing multihazard-resistant buildings. Seismic-resistant construction standards were provided by the state government. Designs of 20 model houses were also provided to the public to choose from with an option to have one’s own design too so long as the basic features of seismic design were incorporated. This approach ensured that adequate seismic design features were incorporated in all structures and that instead of being uniform, reconstructed houses were tailored to owners’ and siting needs, as is usually found in the case of the organic evolution of settlements.

Relocation of villages also occurred in Gujarat. Sites were identified and land-use plans developed using technical hazard data and through consultation with the affected communities who would be impacted by the resettlement program. Plans were disseminated to and discussed with communities in a transparent manner to ensure ownership in the process.

Pakistan: Rural housing reconstruction
In Pakistan following the South Asia Earthquake in 2005, the government conducted a multisectoral dam-
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age and loss assessment to determine the primary areas of focus for reconstruction. The outcome was that rural housing reconstruction was a priority. Upon independent assessment of the damage based on a common methodology, the government provided cash grants in tranches to individual bank accounts. Homeowners provided their own resources to subsidize additional costs. Beneficiaries were also expected to use their own labor and/or to hire contractors, as well as recycle building materials from the debris, to the extent possible.

The government developed a rural housing reconstruction strategy, in which RS 175,000 (USD 2,917) was provided in four tranches, sufficient to provide each beneficiary with a core housing unit of approximately 23–37 square meters depending on his/her choice of a structural solution. Partially damaged houses received grants of RS 75,000 (USD 1,250) in two tranches. In addition, the compensation program was based on the number of houses affected, and not number of households. So if more than one family lived in one house, only the owner received the grant. This approach was possible since the homeowners themselves drove the reconstruction process and signed Memoranda of Understanding with the government to reconstruct their houses and receive the tranche payments. This helped to increase ownership and to ensure sustainability of the program.

An interesting aspect of the Pakistani program was the attention to quality assurance. World Bank-funded projects included a technical audit of reconstructed buildings, in which a number of construction defects were detected. A manual and program for correcting these defects was developed and successfully implemented, assuring that in the end most of the reconstructed houses had adequate seismic resistance.

Turkey: Urban housing reconstruction

The 1999 Marmara Earthquake registered Mw 7.4 and killed over 17,400 people while injuring a further 44,000 people. Up to 600,000 people were made homeless and over 113,000 housing units were damaged or destroyed. The Government of Turkey sponsored the construction of low-cost apartments to accommodate 200,000 people who were left without homes. The Turkish government drew up an emergency earthquake framework program in collaboration with the World Bank, other lenders, and the United Nations Development Programme totaling about USD 1.795 billion. Estimated financing provided by the government per housing unit was approximately USD 20,000 including on-site infrastructure.

In addition, at the time of the earthquake, housing insurance was not developed in Turkey, in part due to the implicit insurance provided through state guarantees to replace owner-occupied housing losses. Thus the bulk of replacement costs fell on the public budget. A Turkish Catastrophe Insurance Pool (TCIP) was created following the earthquake to address the issue of transferring risk from the public to the private sector. The TCIP is supported by the Government of Turkey, the World Bank, and the private sector reinsurance company Milli Re. More information on the TCIP is available in the Disaster Risk Reduction note.
Lessons Learned

Common to the two experiences of India and Pakistan is the government provision of a fixed subsidy to homeowners based on an agreed damage assessment methodology. This is one successful approach, since it is transparent, based on sound principles, and easily communicated to distressed communities. Reconstruction is subsidized by the government through grant payments disbursed in tranches to ensure compliance with standards. In the case of Pakistan, the first disbursement of about 14 percent of the total amount was released quickly for immediate shelter needs, while the balance of 86 percent was used for permanent housing.

Through the provision of grants based on the outcome of a damage assessment, the Governments of India and Pakistan supported the reconstruction of a core housing unit to higher standards that can be expanded to meet family needs over time. This provides shelter in the medium term while allowing homeowners the flexibility to meet longer-term spatial needs. These grants for housing have been complemented by social safety nets for the disadvantaged and absolute poor.

Any reconstruction of housing, public buildings, and infrastructure should include disaster-resistant technologies and site selection. There is a need to assess whether the reasons for relocation are technically correct before planning to relocate people or entire villages and towns. When relocating people away from one risk, it is important to keep exposure to new risks in mind.

In Pakistan, effective partnerships with “partner organizations” (e.g., nongovernmental and international organizations) were mobilized to oversee/monitor housing reconstruction progress in the field, contribute to capacity building and emergency preparedness, and ensure compliance with the seismic-resistant construction standards. The military also worked with these partners to conduct regular field inspections of progress.

Another lesson is the importance of training homeowners, designers, builders, and local artisans in seismic-resistant construction methods and standards. For example, in Pakistan, more than 80,000 artisans, supervisors, beneficiaries, and community members have been taught about seismically safe construction designs and methods. This training provided local artisans with the technical knowledge of how to build to higher standards and reduce the future vulnerability of people’s homes to earthquakes.

A key lesson from the Turkish example is the development of a mechanism to transfer risk from the public to the private sector. This development, from a purely government subsidy-based reconstruction system to an increasingly insurance-financed reconstruction system, is an important step through which markets can be developed to absorb financial risk and thereby reduce the fiscal and capacity strain on governments at the time of a disaster.

Another lesson learned from the Turkish program is that social networks and livelihood opportunities existing prior to a disaster are important to take into consideration when planning resettlement programs. The Marmara recovery program took these issues into account. For example, the reconstructed apartment complexes included health care facilities supplied with medical supplies and equipment, schools, walkways, sport fields, playgrounds, and landscaped parks. So too, care was taken to ensure that the apartments not only allowed for the residents to adjust psychologically after the earthquake but also to become owners of homes having a value on par with the regional real estate market. Consequently, access to transportation and employment opportunities were ensured.

Recommendations

The policy decisions made by the Government of China to meet the needs of affected homeowners will set a
precedent for financial and technical support following future Chinese disasters. The general lessons learned from previous examples are sound guiding principles. While decisions are made to address short-term needs, it is important to bear in mind the longer-term strategy for housing reconstruction and policy. It is recommended that government consider:

**Short term**

- Establish clear criteria and the methodology for conducting a housing damage and loss assessment.
- Quickly undertake a comprehensive and thorough damage assessment of the housing stock, working closely with the affected communities. This assessment could be carried out in two stages: (i) a rapid, initial assessment to provide a basis for quick estimations of needs and related costs; and (ii) more comprehensive community-level assessments, which could begin in parallel to the rapid assessment. (Demographic surveys need to factor in the ratio of renters-to-owners and issues of affordability.)
- Create technical capacity to carry out building-by-building inspection; this typically requires special training of a large number of inspectors.
- Establish updated technical design standards and building codes for all building reconstruction in urban and rural areas.
- Undertake comprehensive multihazard mapping and evaluation activities to decide on reconstruction criteria and planning of community relocation if necessary. These should be reflected both in the technical standards and spatial planning criteria: housing, social facilities, infrastructure, transport, and environmental considerations (e.g., location and transport of toxins, and reservoirs).

**Medium term**

- Ensure housing policies and operational approaches are integrated with infrastructure reconstruction programs. Housing programs at the minimum need to include budget provisions for basic infrastructure and building service connections.
- Develop financing and delivery strategies, differentiating between reconstruction, repair, and relocation for both urban and rural homeowners while maintaining social equity and balance. Preparing a practical policy balancing between grants, loans, and affordability, and putting in place social safety nets for disadvantaged groups (e.g., the elderly, vulnerable, low income, and disabled) will require careful analysis of the damage assessment findings.
- Develop institutional arrangements, including a robust monitoring system for the implementation of the various reconstruction programs.
- Develop a multi-tiered quality control system for the physical reconstruction program.

**Long term**

- Reduce fiscal exposure to future disasters by examining international experience in catastrophic insurance programs, targeting private housing and tailoring appropriate instruments for China and put in place a legal and regulatory framework for insurance mechanisms.
- Identify options and put in place programs for: (i) addressing problems within the banking sector of possible mortgage defaults and (ii) measures to address the social issues caused by the negative net worth of mortgage holders due to property destruction.

**End Note**

## ANNEX 1: Comparison of recent disasters and housing reconstruction financing policies

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Event</th>
<th>Severity</th>
<th>Affected Area and Population</th>
<th>Number of Damaged and Destroyed Houses</th>
<th>Government Housing Reconstruction Financing Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gujarat, India</td>
<td>26 Jan 2001</td>
<td>Earthquake</td>
<td>6.9 Rs</td>
<td>182,639 sq km 12 districts 7,633 villages</td>
<td>About 1,118,000, including damaged houses and 233,660 destroyed houses.</td>
<td>A range of grant amounts were provided based on rural versus urban context, housing type, and level of damage. In rural areas a maximum of Rs 90,000 (USD 2,117) per destroyed house to reconstruct a core unit of 45 sq m. In urban areas, maximum grants of Rs 175,000 (USD 4,117) to reconstruct a 50 sq m core unit.</td>
</tr>
<tr>
<td>South Asia</td>
<td>8 Oct 2005</td>
<td>Earthquake</td>
<td>7.8 Rs</td>
<td>73,000 people died Damage and losses: USD 5.2 billion Impact on economy: 0.4% of GDP (excluding AJK).</td>
<td>Destroyed: 204,000 Damaged: 197,000 After a detailed building survey, 500,000 needed complete reconstruction and 100,000 needed repairs.</td>
<td>Rp 175,000 (USD 2,917) was provided as a grant per household for destroyed houses and Rs 75,000 (USD 1,250) to repair damaged houses.</td>
</tr>
<tr>
<td>Yogyakarta–Central Java, Indonesia</td>
<td>2006</td>
<td>Earthquake</td>
<td>5.9 Rs</td>
<td>Over 5,700 people killed Damage and losses: USD 3.1 billion Impact on economy: 4% of Yogyakarta–Central Java GDP and 1.3% National GDP.</td>
<td>An estimated 154,000 houses were completely destroyed and 260,000 houses suffered some level of damage.</td>
<td>Rp 15-20 million (USD 1,670-2,200) was provided as a grant per household, through a community-based approach.</td>
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<tr>
<td>Aceh, Indonesia</td>
<td>26 Dec 2004</td>
<td>Tsunami and Aftershocks</td>
<td>March 2005</td>
<td>130,000 people killed Damage and losses: USD 4.5 billion Impact on economy: 97% of Provincial GDP and 2% of National GDP.</td>
<td>125,000 destroyed and some 20,000 damaged.</td>
<td>Destroyed houses replaced where families identified. Community-based implementation. Funded as grants from multiple sources (government, bilaterals, multilaterals, and NGOs). Target core area 36 sq m initially, 100% financed. Repairs were supported through grants based on the level of damage.</td>
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<td>Marmara, Turkey</td>
<td>17 Aug 1999</td>
<td>Earthquake</td>
<td>7.4 Rs</td>
<td>Over 17,000 people killed Between 400,000-600,000 people were left homeless Total fiscal impact: USD 3-6.5 billion.</td>
<td>113,000 housing units damaged or destroyed.</td>
<td>Housing was reconstructed using contractors, with emphasis on rebuilding communities, including social and other infrastructure and access to employment opportunities. Estimated financing required per unit at about USD 20,000—including on-site infrastructure.</td>
</tr>
<tr>
<td>Kobe, Japan</td>
<td>17 Jan 1995</td>
<td>Earthquake</td>
<td>7.3 Rs</td>
<td>Damage and losses: USD 87 billion (estimate).</td>
<td>249,000 housing units damaged or destroyed.</td>
<td>¥ 300,000 (USD 2,700) per household. 1 Private house reconstruction was responsibility of individuals; loan funds made available from Restoration Fund, subject to individuals' ability to service loan.</td>
</tr>
<tr>
<td>North China: Hebei and Shanxi Provinces</td>
<td>1990</td>
<td>Multiple Earthquakes</td>
<td>5.0–6.1 Rs</td>
<td>25,000 mainly privately owned houses, plus schools, clinics, and public buildings destroyed.</td>
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<td>Private houses reconstructed through 15-year loans at 1.3%. Managed at the village level.</td>
</tr>
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<td>Lijiang, China</td>
<td>1996</td>
<td>Earthquake</td>
<td>7.0 Rs</td>
<td>309 people reported dead. Significant loss of livestock.</td>
<td>410,000 houses reported damaged or destroyed.</td>
<td>House reconstruction by homeowner, local government provided grants covering 25-30% of total. Reconstruction cost provided according to the level of damage.</td>
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1 Complementary to public funding, private banks provided ¥ 900 billion (about USD 8.8 billion) in long-term loans to the prefecture and city, and in turn the national government established a similarly sized fund to ensure against default. Over time, the reconstruction fund provided interest-free, long-term loans to more than 30,000 businesses and households, and supported other reconstruction activities that were not covered by the national government programs.
Special thanks to the partners who support GFDRR’s work to protect livelihoods and improve lives: Australia, Canada, Denmark, European Commission, Finland, France, Germany, Italy, Japan, Luxembourg, Norway, Spain, Sweden, Switzerland, United Kingdom, UN International Strategy for Disaster Reduction, USAID Office of Foreign Disaster Assistance, and the World Bank.