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Post-Disaster Housing Recovery

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Summary and Keywords

Rapid urbanization and growing populations have put tremendous pressures on limited global housing stocks. As the frequency of disasters has increased with devastating impacts on this limited stock of housing, the discourse on post-disaster housing recovery has evolved in several ways. Prior to the 1970s, the field was largely understudied, and there was a narrow understanding of how households and communities rebuilt their homes after a catastrophic event and on the effectiveness of housing recovery policy and programs designed to assist them. Early debates on post-disaster housing recovery centered on cultural and technological appropriateness of housing recovery programs. The focus on materials, technology, and climate missed larger socioeconomic and political complexities of housing recovery. Since then, the field has come a long way: current theoretical and policy debates focus on the effect of governance structures, funding practices, the consequences of public and private interventions, and socioeconomic and institutional arrangements that effect housing recovery outcomes.

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There are a number of critical issues that shape long-term post-disaster housing recovery processes and outcomes, especially in urban contexts. Some of them include the role of the government in post-disaster housing recovery, governance practices that drive recovery processes and outcomes, the challenges of paying for post-disaster housing repair and reconstruction, the disconnect between planning for rebuilding and planning for housing recovery, and the mismatch between existing policy programs and housing needs after a catastrophic event—particularly for affordable housing recovery. Moreover, as housing losses after disasters continue to increase, and as the funding available to rebuild housing stocks shrinks, it has become increasingly important to craft post-disaster housing recovery policy and programs that apply the limited resources in the most efficient and impactful ways. Creating housing recovery programs by employing a needs-based approach instead of one based solely on loss could more effectively focus limited resources on those that might need it the most. Such an approach would be broad based and proportional, as it would address the housing recovery of a wide range of groups based upon their needs, including low-income renters, long-term leaseholders, residents of informal settlements and manufactured homes, as well as those with preexisting resources such as owner-occupant housing.

Keywords: housing, disaster, recovery, reconstruction, policy

Housing recovery refers to the repair and reconstruction of damaged and destroyed housing following a disaster event. It can be narrowly delineated as a process where communities or individual households rebuild, repair, and replace their housing using personal funds, private loans, insurance payouts, community resources, or governmental assistance. More broadly, housing recovery involves a variety of factors that influence a household's ability to rebuild after a disaster, such as the condition and location of the house prior to the disaster (e.g. housing in unsafe areas such as floodplains or steep hillsides are more at risk to damage and loss), type of housing tenure (e.g. owner occupant, long-term leaseholders, renters, informal settlement residents), quality of building materials used, and access to resources, information, and services. Housing recovery is also a function of factors such as class, caste, ethnicity, gender, age, and health that influences household access to resources that impact housing recovery such as stable employment, savings, education levels, and social capital.

Impact of Disasters on Housing

A house is more than just a shelter. Access to adequate housing is tied to a household's health, education, and economic stability (Viveiros & Sturtevant, 2014). The loss of a house deeply impacts the earning capacity of a household (Comerio, 1998) as well as the health and well-being of its members. Globally, population growth and uncontrolled building in risky areas has exposed increasing number of existing housing stocks to environmental hazards. Between 1900 and 2015, 132 million people lost their homes during disasters caused by environmental hazards such as floods, storms, earthquakes, and wildfire. Floods and storms together have been responsible for 79% of all disaster-related homelessness. Flooding alone, due to riverine flood, flash flood or coastal flood, accounted for 49% of disaster related homelessness (65 million people), the majority of whom (89%) live in Asia. Similarly, storms such as hurricanes, tornados, and tropical cyclones have caused 30% of all disaster-related homelessness (40 million), with 87% of those affected in Asia. Despite the greater media attention given to earthquakes that cause catastrophic damage and destruction, they account for just about 17% of disaster-related homelessness, followed by mass movements such as landslide and avalanche (3.2%), volcanic activity (0.3%), extreme temperature (0.2%) and wildfire (0.1%) (Based on data from: EM-DAT).

By far, the highest percentage of housing loss has occurred in Asia, where disaster events have caused 85% of total global homelessness. This is followed by the Americas at 7.5% and Africa at 6%. The vast majority of homelessness due to disaster events occurred in low- or middle-income countries. Among the top 10 countries with the highest number of disaster-related homelessness, 8 are in Asia with China (63 million homeless), India (32 million homeless) and Bangladesh (14 million homeless) in the top three positions (Based on data from: EM_DAT, Retrieved 2016).

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Table 1: Total and percent homelessness caused in five geographic areas due to eight different types of environmental hazards (1900–2015). Source: D. Guha-Sapir, R. Below, Ph. Hoyois—EM-DAT: The CRED/OFDA International Disaster Database—Université Catholique de Louvain—Brussels, Belgium.

Hazard Type & Percent Impact	Hazard Subtype	Resulting Homelessness (1900 to 2015)					
		Total	Africa	Americas	Asia	Europe	Oceania
Flood (49%)	Riverine Flood	60,213,622	4,219,048	1,473,179	54,116,591	354,704	50,100
	Flash Floods	2,712,292	506,895	346,454	1,841,643	11,000	6,300
	Coastal Flood	1,673,924	--	104,530	1,569,309	--	85
Storm (30%)	Tropical Cyclone/ Hurricane	38,402,276	1,770,525	3,117,898	33,259,202	300	254,351
	Convective Storm (e.g., Hail,	2,118,533	77,549	191,559	1,815,084	33,296	1,045

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	Tornado, Sand Storm)						
	Tropical Storm	1,600	--	1,600	--	--	--
Earthquake (17.1%)	Ground Movement	21,734,437	915,424	4,376,203	15,049,653	1,373,037	20,120
	Tsunami	1,035,929	70	750	1,035,109	--	--
Mass Movement (3.2%)	Landslide	4,212,838	31,404	245,876	3,908,993	8,565	18,000
	Avalanche	45,310	--	--	45,250	60	--
	Rock Fall	680	625	--	55	--	--
Volcanic Activity (0.3%)	Ash Fall	375,790	180,710	31,180	103,900	14,000	46,000
Extreme Temperature (0.2%)	Cold Wave	249,000	--	16,000	233,000	--	--
	Severe Winter	6,587	--	5,247	--	1,340	--

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Wildfire (0.1%)	Forest Fire	129,823	5,350	36,598	79,285	8,101	489
	Land Fire	54,472	13,222	12,295	9,000	552	19,403
Drought (0.02%)	Drought	20,000	--	--	20,000	--	--
Total		132,987,113	7,720,822	9,959,369	113,086,074	1,804,955	415,893
Percent Homelessness			6%	7.5%	85%	1.4%	0.3%

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During the initial weeks after a catastrophic event that leads to homelessness, the immediate demand is for emergency shelter for short periods of time, as in a few hours or a few days. This morphs into the need for temporary housing over the next several weeks and months: as the repair and reconstruction of damaged and destroyed housing can take years. According to Quarantelli (1982), there are four phases of post-disaster housing recovery: emergency sheltering (e.g. housing impacted populations temporarily in schools), temporary sheltering (e.g. in tents), temporary housing (e.g. trailers or manufactured units located on temporary housing sites), and permanent housing (e.g. new housing built or existing units repaired). These stages do not necessarily follow a sequential pattern but rather blur and merge into one another, while occurring simultaneously or in different sequences among different communities. Housing recovery in the past has varied widely depending on social, economic, political and other unique local contexts. Government intervention in housing recovery has ranged from highly centralized rebuilding programs to laissez faire policies of letting housing markets do their work and numerous in-between variations that employ some combination of the two. While individuals and communities play a major role in housing recovery, the involvement of non-governmental (NGO) and non-profit organizations (NPO) have also increased over the decades.

Table 2: Top 10 countries with the highest number of homelessness due to disaster events from 1900 to 2015. Source: D. Guha-Sapir, R. Below, Ph. Hoyois—EM-DAT: The CRED/OFDA International Disaster Database—Université Catholique de Louvain—Brussels, Belgium.

Country	Homelessness Caused Due to Disaster Events
China	63,795,740
India	32,565,027
Bangladesh	14,297,930
Pakistan	9,659,290
Philippines	6,123,573
Vietnam	4,761,050
Sri Lanka	4,520,065
Indonesia	1,806,648
Chile	1,698,874

Sudan

1,453,480

Role of Government in Housing Recovery

The role of government in housing recovery has been the subject of debate for some time. Should government be involved in the recovery of privately owned property? In what ways and to what extent should it be involved? What types of assistance should a government provide? Whom should it be provided to? The answers to these questions vary greatly depending on local socioeconomic and political contexts and shape how governments at multiple levels respond to housing needs after disasters.

In the 19th and early 20th century, large swathes of the Americas, Asia, and Africa were under colonial rule and not much is known about how communities and governments responded to post-disaster housing needs during this period. The scant information available comes from disasters in North American and Japanese cities where post-disaster long-term housing reconstruction was left mostly to the private sector, albeit with some governmental intervention in building codes and construction practices. In late 19th century Tokyo, after repeated fires in dense urban districts built of wooden structures, building ordinances requiring plaster fire-proofing or fire-resistant roof materials were put in place. These measures did little to prevent the fires, as residents resisted the use of expensive fire-resistant materials that only the wealthy could afford. Instead, individual homeowners employed cheap construction practices to rebuild quickly and reduce financial loss with barely any thought to fire hazards. After subsequent fires, urban planning techniques were implemented such as street widening, construction of canals and building brick walls to create firebreaks between major thoroughfares, and cheaply built wooden row houses for rental. Yet governmental interventions could not prevent widespread damage and destruction after the 1923 Great Kanto earthquake and consequent fires (Hein, 2005).

Similarly, after the 1906 San Francisco earthquake and fires, the city was rebuilt within just four years, financed privately by the wealthy and the powerful. At the time the city was an industrial and commercial port city with a predominantly working-class population and large number of new immigrants who crowded into wood-frame buildings prone to fire. The disaster destroyed 500 city blocks and left half the city's population (250,000 people) homeless. About 75,000 people left the city after the disaster, and the remaining population moved into makeshift camps. There was some government intervention during this period as the army housed 20,000 people in military-style tents and managed 21 of the city's 26 official refugee camps. Through a joint collaboration between the army, the San Francisco Relief Corporation, and the San Francisco Parks Commission, the city also constructed more than 5,000 small wooden cottages for those still in need of housing after the camps closed (National Park Service [NPS], Retrieved

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December 2016). A comprehensive building plan designed for San Francisco prior to the quake was never adopted, and the rebuilding was hasty and unplanned. The rebuilding also faced problems, as property owners' resisted changes to building codes, insurance claims were not paid, and labor and material prices skyrocketed after the disaster (Comerio, 1998). The typology of the rebuilt housing stock remained the same: narrow streets with densely built large wood-frame structures three to four stories high and vulnerable to fire.

The frequency of disasters significantly increased toward the last quarter of the 20th century as urbanization and population growth in risky areas put more people and property in harm's way. Since the 1970s, a growing body of knowledge has shed light on housing recovery approach and outcome after catastrophic events. Although housing recovery has undergone significant change since the early 20th century, questions concerning the role of the government during post-disaster housing recovery remain. Government involvement in managing large-scale publicly funded construction of housing as observed in China following the 1976 Tangshan earthquake and in Turkey after the 1999 Marmara earthquake forms one end of the spectrum of governmental response to post-disaster housing needs. In China, over 95% of Tangshan's housing stock, consisting mainly of single story houses made of brick and stone, was lost as the city was reduced to rubble during the earthquake. The city was an important industrial hub, and the Chinese Communist Party controlled its reconstruction through a highly centralized rebuilding program. The city layout put forward by urban planning experts separated residential and industrial zones and was designed on a grid system with wider roads and more open green spaces to reduce the urban density. A uniform typology for apartment housing using concrete construction was adopted resulting in rows of identical slab housing no more than six stories high. There was no input throughout the process from impacted households for whom the units were built (Chen, 2005).

In Turkey following the 1999 Marmara quake, an agency established directly under the prime minister's office oversaw housing construction of more than 14,000 units. Referred to as the Project Implementation Unit (PIU), PIU was the main implementing office of the World Bank, the primary funding agency for the Marmara Earthquake Emergency Reconstruction (MEER) project. The agency controlled the design, construction, and distribution of housing units to eligible households. To solicit feedback from project participants the PIU conducted two rounds of participatory meetings. The meetings were uncoordinated and took place late in the reconstruction process. Not surprisingly, the feedback received on housing unit design could not be incorporated into the reconstruction plans (Ganapati & Mukherji, 2014; Ganapati & Ganapati, 2009). The centralized and publicly funded and built housing reconstruction programs in China and Turkey are examples of strong government control with little to no public participation in the housing recovery process. Such highly controlled programs where decision-making is centralized at the national or state government levels have been heavily criticized for producing socioculturally inappropriate units built using low-quality construction

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materials that do not meet climatic conditions, local housing needs, and community concerns (e.g. forcing relocation and resettlement).

Since early 21st century, these critiques, combined with funding limitations, have left little appetite among governments in general to intervene in housing through the construction and management of large centralized housing projects. Government approach to housing recovery has evolved from that of a direct provider of housing to one that sets policy, offers financial assistance, and gives technical support while largely placing responsibility upon the market and other private entities such as non-governmental organizations for the construction and provision of housing. This approach has gained wider acceptance as somewhat evidenced by housing recovery policies in India after the 2001 Gujarat earthquake, in Iran after the 2003 Bam earthquake, and in Indonesia after the 2004 Indian Ocean earthquake and tsunami—and in Chile after the 2010 earthquake. Although the funding mechanism varied, governments in these countries were closely involved in planning, funding, and setting housing recovery policy. Subsidies and public funding for housing were provided in various forms, while the construction of the housing units was largely left to property owners, local builders and contractors, and non-governmental organizations. For instance in Chile, the national government through the Ministry of Housing and Urban Development (MINVU) controlled the finance, set standards, and strictly monitored the housing rebuilding process, while leaving the actual construction to be managed by regional governments and local builders (Comerio, 2013, 2014). In contrast, after the 2008 Wenchuan earthquake in China, the Chinese Communist Party adopted a similar approach to the one taken after the 1976 Tangshan quake, creating highly controlled and centralized reconstruction programs with no local input. While government intervention in housing recovery has in general evolved from highly centralized rebuilding programs to a greater focus on recovery policy and financing, it is important to note that there are numerous in-between variations that employ some combination of the two and can lean one way or the other.

The publicly financed and privately built approach to post-disaster housing recovery has been credited for offering choice and flexibility to homeowners during rebuilding. Yet, its almost exclusive focus on homeowners has come at the cost of affordable housing that includes low-income rental units, informal housing, and other types of tenure arrangements, which has created new inequities or reinforced existing ones. In India, an Emergency Reconstruction Loan from the World Bank was used to provide public funding support for housing reconstruction after the 2001 Gujarat earthquake. The Gujarat State Disaster Management Authority (GSDMA), a public agency formed by the Gujarat state government to plan and implement reconstruction of housing and infrastructure in the state, distributed public funding and set urban and rural housing recovery policies. Rebuilding in both rural and urban areas was publicly funded. Public financial assistance to urban property owners for housing repair or rebuilding was released in three installments through direct bank deposits and was based upon the building materials used prior to the disaster (masonry or reinforced concrete), the size of the house, and the extent of the damage. Local nongovernmental organizations, religious groups,

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community-based entities, and others carried out housing construction in rural areas under a public-private partnership. Rural communities were given the choice to decide which organization they wanted to invited to rebuild their houses. In urban areas, property owners were given the choice to relocate to a plot on a government-designated relocation site or rebuild in situ (Mukherji, 2010, 2015).



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Figure 1: Owner built homes in-situ (left) and on relocation site (right) in Bhuj, India after the 2001 Gujarat earthquake

(Source: Photograph by author).

Touted as an “owner-driven” model (i.e. rebuilding led by homeowners) as opposed to a “donor-driven” (i.e. rebuilding driven by donor agencies) or “State-driven” (i.e. rebuilding driven by government

agencies) model, the program was geared mainly toward homeowners. The highly successful approach gave complete control and decision-making powers to homeowners regarding the choice of building materials, the construction process, and the house design as long as it adhered to the new seismic and building guidelines. Households had direct control and supervision over the construction of their house, with local artisans, building contractors, or contract laborers doing the actual construction work. Although there was some indirect provision for renters through subsidies for rental property owners, the policy did not directly address the housing needs of low-income renter households and those in informal settlements. The emphasis on the “owner-driven” aspect of the program became the primary mechanism to frame post-disaster housing recovery and the housing needs of those that did not own a home was marginal within this policy framework (Mukherji, 2015; Tafti, 2015; Tafti & Tomlinson, 2013). The owner-driven model has been advocated by key lending organizations such as the World Bank that has been in a position to influence post-disaster housing recovery strategy globally. The model is now widely adopted and was employed after the 2003 Bam earthquake in Iran, the 2005 Pakistan earthquake, and in Thailand after the 2004 Indian Ocean earthquake and tsunami.

Finally, housing recovery that is privately funded and built comprises the other end of the spectrum of governmental response to post-disaster housing recovery as in the United States. In the United States, governments at local, state, and federal levels refrain from playing an active role in housing reconstruction, leaving the task of rebuilding mainly to market forces with some assistance from the Federal Emergency Management Agency (FEMA). Property owners are responsible for repair or rebuilding using their personal savings, loans, private insurance, and limited federal assistance. This system has worked best for well-insured homeowners. However, an increasing majority of the urban population that lives in multifamily rental units, residents and owners of multifamily units or subsidized rental properties (Comerio, 1997; Kamel & Loukaitou-Sideris, 2004), and those residing in manufactured or mobile homes who are without insurance or personal funds remain at risk to severe housing problems after disasters. The approach has

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created uneven housing recovery across income groups as homeowners and high-income neighborhoods recover quickly, but relatively few low-income and multi-family housing units are rebuilt after a disaster and/or take longer to recover (Peacock et al., 2014; Zhang & Peacock, 2009).

Housing Recovery Governance

As governments in general have moved away from large highly controlled and centralized rebuilding programs, there is some argument in favor of decentralized governance during housing recovery as a way to include local communities in rebuilding efforts (Mansuri & Rao, 2004; Taylor, 2007). However, local governments can lack sufficient authority, material resources, or trained staff to deal with large-scale urban disasters. While decentralization creates space for local participation, during large-scale disasters centralized government agencies frequently assert command over local governments instead of working with them as partners (Kapucu, 2012; Moynihan, 2009).

The period of disaster recovery is characterized by time compression (Olshansky et al., 2012), a phenomenon of heightened activity in condensed time and space, one that often justifies the approach to centralize recovery. To this end, parallel structures of governance have increasingly become the normative model for government response to catastrophic disasters. These structures can be defined as entities vested with special authority and powers that allow them to bypass the established norms and procedures of governance and work across and outside of conventional governmental boundaries to coordinate and execute disaster reconstruction and recovery. Although the reasons for the establishing of parallel structures vary, some of the common arguments are that the current system of governance is slow, inefficient, and inadequate to address the rapidly shifting and dynamic conditions of post-disaster recovery; that disaster recovery is an emergency situation that warrants emergency measures including a special entity set up to solely focus on recovery issues and mitigate crises without the distractions of day-to-day governance; and that a powerful structure established outside the current system of governance can check corruption and offer greater accountability during post-disaster reconstruction.

Framed as a way to improve the speed, efficiency, and accountability of post-disaster governance by harnessing the uncertainties and complexities of disaster recovery processes, these structures are, however, unable to eliminate conflict or address local capacity building and often undermine local institutions. This raises questions whether parallel governance structures in post-disaster contexts are truly efficient and better. Following the 1999 Marmara earthquake, the World Bank established a project implementation unit (PIU) under the prime minister's office to coordinate and manage the Marmara Earthquake Emergency Reconstruction (MEER) project. However, PIUs have been heavily criticized for setting up outside of and circumventing the government structures that are already in place in the borrowing countries (World Bank, 2005). In Turkey, while the PIU was set up to ensure time completion of housing reconstruction projects funded by the World Bank in Turkey, its projects were criticized for the culturally inappropriate configuration of the toilets, inequity in the size of housing units, and the lack of supporting infrastructure (i.e. schools, grocery stores). One year after the PIU

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units were distributed to recipient households, almost half the units remained vacant (Ganapati & Mukherji, 2014).

In India, after the January 2001 Gujarat earthquake, the Government of Gujarat (GoG) responded to the earthquake through immediate centralization of governance at the state level. It swiftly formed the GSDMA, a public agency directly under the Office of the Chief Minister with the authority to make decisions, plan for and execute reconstruction of housing and infrastructure in the state. The GoG established Area Development Authorities (ADAs) in each of the four impacted urban areas (i.e. Bhuj, Bachhau, Anjar and Rapar) in Kuch to implement urban development plans, and appointed handpicked Chief Executive Officers (CEOs) to each authority (Mukherji, 2016). There was no local representation on the boards of the ADAs, which could have helped to improve the proposed plans and lend them legitimacy. The municipality (local elected body) in each urban area was also completely sidelined. Although the ADAs prepared the development plans, issued building permissions, and were thus dominant in the reconstruction process, the capital assets and its operations and management were to be eventually handed over to the municipality. Nevertheless, there was no systematic process of involving municipalities and/or building local municipal capacity to enable a smooth transition (Balachandran, 2010).

In contrast to Turkey and India, after the 2011 Great East Japan Earthquake and Tsunami, a variety of institutional arrangements were put in place to shore up Japan's semi-decentralized disaster recovery governance. Disaster management in Japan is the shared responsibility of the national government, prefectural governments, and municipalities. Following the 2011 disaster, there was a severe staff shortage in the disaster-impacted municipalities of Tohoku, as many municipal government officials were killed by the tsunami. Institutional arrangements were created to mobilize and dispatch municipal employees from various geographical regions of Japan to Tohoku—first during the emergency response stage and then during recovery and reconstruction—to take on the work of civil servants to help disaster hit municipalities function (Aoki, 2016).

Affordable Housing Recovery

The necessity for comprehensive housing recovery policies following disasters that would address the needs of a wide range of housing and income groups is more urgent than ever. Globally, the largest proportion of post-disaster funding for housing recovery has been allocated toward the reconstruction of damaged or destroyed private property (Comerio, 1998; Mukherji, 2010) that has predominantly favored owner-occupied housing. As housing reconstruction policy and resources after disasters has catered to property owners with legal title to land, it has come at the cost of affordable housing recovery, in particular low-income rental units and those without land such as renter households and the residents of informal settlements (Dudley, 1992; Freeman, 2004;

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Ganapati, 2013; Mukherji, 2010, 2015). Public resources for the reconstruction and recovery of post-disaster low-income and affordable housing have been woefully inadequate.

Low-income households are hit the hardest during disasters, as they have fewer resources to rebuild their homes, are more vulnerable to displacement, and are least able to access safe and affordable housing after a disaster. In the rapidly urbanizing regions of low- and middle-income countries, informal housing on illegally occupied land (squatting) or illegally subdivided land is a growing source of low-cost accommodation for low-income households (Al-Sayyad, 1993; Hardoy & Satterthwaite, 1986). About one-third of the global urban population totaling more than 850 million people live in informal housing (UN-Habitat 2014). Because residents of informal housing choose land based on aspects such as cost (i.e. cheapest available sites in tight urban markets), possibility of forceful eviction, and access to income opportunities, such housing developments are frequently located on hazardous places such as deforested or degraded land, landfill sites, steep unstable slopes, coastal flood plains, or active alluvial fans (Diaz, 1992; Doberstein, 2009; Fay, 2005; Hardoy & Satterthwaite, 1986; Pelling, 2003; Tipple, 2005; United Nations Center for Human Settlement, 2001). A combination of poor location, inadequate infrastructure, low-quality housing construction, lack of access to basic services, and insecure tenure places informal housing developments at greater risk to loss and damage during disasters (Adelekan, 2010; Alexander, 2000; Fay, 2005; Green, 2008; Mulwanda, 1989; Rumbach, 2014; Wisner et al., 2004).



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Figure 2: Rebuilt informal housing in Bachhau, India after 2001 Gujarat earthquake

(Source: Photograph by author).

However, the prospects of informal housing recovery after disasters seems daunting as governments' have been largely unprepared, unable, or unwilling to address the complexities of informal housing recovery that can entail conflicts and struggles around urban land and issues around

land titles (Mukherji, 2011). Land is particularly relevant to informal housing due to the link between lack of land tenure and the high degree of vulnerability to environmental hazards (Doberstein & Heather, 2013; Pelling, 1999; Reale & Handmer, 2011). Insecurity of tenure or loss of land following a disaster results in homelessness or inadequate housing, displacement and loss of livelihood, that in turn creates major impediments to housing recovery (Reale & Handmer, 2011).

Among the few critically documented cases of informal housing recovery is that of Bachhau in India after the 2001 Gujarat earthquake. In Bachhau, the local disaster reconstruction agency (Bachhau Area Development Authority) implemented an informal

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housing recovery program as a mechanism to control private land speculation. Issuing tenure titles and building infrastructure within informal settlements were key elements of the program to check land speculation that had begun after urban development plans for the town was made public. Although initially reluctant, the Government of Gujarat eventually authorized tenure titles to squatters as part of the recovery program only as an exception for the town of Bachhau (Mukherji, 2016). This is not surprising, as land regularizing can be a difficult and controversial process after disasters. Public officials may be reluctant to regularize squatter settlements seen as violating property rights, as it can be interpreted as rewarding illegal behavior that might encourage further encroachment on government land (Fay, 2005). Moreover, in large urban areas local governments may not have adequate human or financial resources to manage the complex process of regularization (Fay, 2005), even more so after a disaster event when the priorities of stressed and overworked government officials at multiple levels might be different and the political stakes high (Mukherji, 2016). It is also important to note that informal settlements are by no means homogenous, stable, unified entities. The bigger the size of informal settlements, the more difficult it might be to arrive at consensus on difficult issues (Mukherji, 2016). For instance, residents of informal housing may disagree with full land tenure that can result in costs such as property tax payments, if they already have a degree of security and services (Fay, 2005).

Another housing group comprising renters makes up one-third of urban housing markets (Gilbert, 2008), and renter households and rental property markets are a critical component of the overall housing and economic recovery of a community after a disaster. As a growing housing group, rentals comprise 10% to 50% of the housing market globally. Yet, policies for housing recovery after disasters fall short in addressing the long-term recovery of the rental housing market or the rehousing of renter households (Comerio, 1997; Kamel & Loukaitou-Sideris, 2004; Mukherji, 2010; Wu & Lindell, 2004). Affordable rental housing units and homes in low-income and minority neighborhoods recover more slowly, and property abandonment can increase after a disaster (Peacock et al., 2014). Without appropriate and adequate governmental assistance, affordable housing such as multifamily rental properties are the least likely to be rebuilt after disasters as they face expensive repairs, can have complex ownership, lack insurance, and do not have sufficient equity for private capital (Comerio, 1997). In Japan, rental units comprised almost 25% of the housing stock lost during the 1995 Great Hanshin-Awaji (Kobe) earthquake. Much of the rental housing in the Kobe inner city consisted of old, low-quality multifamily wooden houses built close together within a dense urban fabric. These units, managed by individuals or families as a side business, were a source of affordable rental housing for low-income households and the elderly. The earthquake destroyed a large number of these private multifamily rental houses, and owners lacked the ability and economic incentive to capitalize their reconstruction. The result has been the disappearance from the Kobe inner city of private low-rent housing options (Hirayama, 2000).

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Although limited and not always appropriate, public policy response for the recovery of rental properties and renter households has varied considerably and can be grouped broadly into five strategies that include creating rental subsidies, providing temporary housing, building subsidized public housing, giving incentives to rental property owners, and crafting renter housing programs (Mukherji, 2015). Renter households have received some post-disaster assistance through rental vouchers following disasters in the United States, through cash assistance for temporary housing in India, and rental subsidies in Japan. However, rental vouchers, cash assistance, or subsidies for short- and long-term housing offered to renters to find alternate housing solutions in the private market can have limited success. This approach works best in weak housing markets, as it is easier to find temporary rental units after a disaster when there are high vacancy rates to absorb the displaced population. In contrast, huge losses of rental units in dense urban neighborhoods can cause housing crises if only few undamaged rental units are available to displaced households at comparable costs (Bolin & Stanford, 1991; Comerio, 1997). In the aftermath of the 2011 Great East Japan earthquake and tsunami, the Japanese government provided 140,000 temporary units not just by giving rental subsidies to displaced households to use in the private rental market but also through subsidized rent-free temporary housing units built after the disaster (Ryo, 2012).

There are some examples, mainly from Japan and Chile, where governments have built public housing units to house renters after a disaster. After the 1995 Great Hanshin-Awaji earthquake in Japan, the government built about 10,000 public housing units at heavily subsidized rates, targeted to low-income and elderly population who were mostly renters prior to the disaster (Kondo & Maly, 2012). Similarly, after the 2010 Chile earthquake, MINVU focused its housing recovery initiatives and housing subsidy programs on low- and middle-income households. Chile has a history of providing housing for low-income households since prior to the quake. Social condominiums house the lowest-income households, and although public funded and built the residents eventually own the units. For housing groups other than homeowners, such as renters, residents of social condominiums and households that shared space in a housing unit prior to the quake, MINVU first provided accommodation at temporary camps. Households had the option to opt out of the camps and rent in the private market using a government rent subsidy. MINVU then designed and built new social condominiums and single-family units to house these groups while community leaders organized clusters of eligible households to apply for the new social condominiums collectively (Comerio, 2013, 2014).

For owners of rental properties, there is often little economic incentive to rebuild after a disaster. In the United States, rental housing comprises a quarter of the total housing stock (Burby et al., 2003) and almost 50% of low-income households are renters (Lee et al., 1995). While public funding and tax credits are made available to landlords to help with long-term recovery of rental housing units, such assistance comes with conditions that can create mismatch with the needs of rental property owners. In New Orleans after the 2005 Hurricane Katrina, although landlords could apply for tax credits, because of

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high construction costs, personal financial vulnerability, and the difficulty of securing private financing as a result of the national credit crunch at the time, small landlords found it challenging to rebuild even with assistance (Quigley, 2007; Rose et al., 2008; Thomas, 2009).

Apart from the challenges outlined in this section for rental households, an argument made against policy support for housing recovery of groups other than homeowners, particularly in low- and middle-income countries, is that why should public policy (that may include financial assistance for rebuilding) be inclusive of groups that do not own private property and do not pay property taxes. There are two reasons why it is important to create a broad policy framework that addresses all housing groups. The first reason is that housing groups other than homeowners (i.e. renters, informal housing residents, households sharing space in a housing unit) can comprise anywhere from 30% to 70% of the urban housing market. With such high percentage of the market serving non-homeowner groups, it is difficult to justify a post-disaster housing recovery policy that addresses only a fraction of the housing market (i.e. homeowners) and ignores the rest. The second reason is that housing is a critical component of the overall economic recovery of a community after disasters. A house, whether it is an owner-occupied property, a rental unit, or an informal dwelling, it is more than just a shelter. It is often a place for economic activities and deeply impacts the earning capacity of a household. It is thus not just the economic recovery of households that is critically tied to housing, but the economic recovery of an urban region is also inextricably linked to its housing recovery. It includes renter households and informal housing residents because these groups are an important part of the urban economy (Mukherji, 2011).

A more appropriate response to the housing needs of low-income renter households can be seen after the 1985 Mexico earthquake. The earthquake caused considerable damage to inner city tenements in Mexico City. These units housed low-income renters and were crowded and in poor condition due to rent control laws that gave little incentive to landowners to maintain their properties. Residents of the destroyed units organized and refused to be moved to a new town outside the city center on a relocated site that would take them away from jobs, transport, and other services. An agency, Renovacion Habitacional Popular (RHP), was created after the quake to manage the expropriation of more than 5,500 rental properties and the rebuilding and repair of more than 42,000 apartments on the original sites. Families were temporarily housed in tin structures lined along the streets. The project extended financial assistance to previous tenants to purchase the newly built subsidized units, re-housing about 78,000 households through the program (World Bank, 1993). Overall, the program recognized the need for affordable housing in the central city and the importance of keeping impacted household within local communities where they had strong family and community ties.

Paying for Housing Recovery

Housing constitutes the largest portion of built structures in any community and thus represents the largest segment of the cost of post-disaster recovery (Comerio, 1998). Globally, a growing proportion of reconstruction funds are directed to housing recovery. It is important to note here that housing recovery issues in urban disasters are quite different than in rural areas as the losses are concentrated in densely populated areas, and urban housing loss not only represents a significant financial investment but also a unique component of the urban infrastructure. Not surprisingly, public assistance for post-disaster housing recovery and housing recovery policy in general responds differently to urban and rural disasters. In high-income countries, communities have relied on a combination of private insurance and government assistance to rebuild and recover from large urban disasters (Comerio, 1998; Zhang & Peacock, 2009). However, as the increased frequency and scale of disasters have led to a rise in disaster related costs, the insurance industry and governments have searched for ways to control costs by limiting insurance policy coverage and by curtailing government programs for future disasters.

In low- and middle-income countries, governments have relied on financial assistance from international organizations (e.g. World Bank, Asian Development Bank, UN agencies) to fund their housing reconstruction needs. The general misperception is that external aid picks up a greater portion of the recovery tab. The reality is that 70% to 80% of expenditures incurred during disasters are usually on the house. The in-house funds are obtained by either dipping into resources allocated toward existing development projects or increasingly by restructuring existing loans from international banking organizations. Following the 1985 earthquake, Mexico obtained recovery funds by restructuring its existing loan from the World Bank. The Bank's Emergency Reconstruction Loan (ERL) is a lending mechanism that allows quick disbursement of a World Bank loan to a recipient country after a disaster, often by restructuring existing World Bank loans to the country and reallocating loan monies from ongoing projects (WB-IEG, 2006). The World Bank's involvement in post-disaster housing has grown considerably in the past few decades. In 1984 funds allocated to disaster-related projects made up 9.4% of all World Bank loan commitments, and by 2003, it had risen to 14% (WB-IEG, 2006). Whereas, one third of these projects had components specifically for housing in early 1980s, by 2003, almost 50% of the World Bank's post-disaster reconstruction loans were directed to housing recovery (WB-IEG, 2006).

Critics question the use of limited government funds to finance private housing recovery that is mostly captured by socioeconomically advantaged groups (i.e. homeowners) diverting money away from urgent infrastructure projects and failing to meet the housing needs of low-income households (Freeman, 2004). Public assistance for housing recovery has been largely determined through "loss-based" assessments (Maki, 2011). Since post-disaster financial assistance is based on loss, owners of pre-disaster housing, mostly middle- and upper-income homeowners, capture assistance allocated to rebuild housing

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stocks that were lost in a disaster. The argument underlying the loss-based approach is that property owners are entitled to assistance because they have lost property as opposed to those who do not own property. This outlook, however, overlooks and marginalizes the equally important housing needs of those that are not homeowners after a catastrophic event (Mukherji, 2011). There is a growing argument to employ a “need-based” assessment for public support of housing recovery that would include low-income households who are unable to appropriately rehouse themselves after a disaster. Post-disaster housing recovery in Japan has taken this approach. Following the Kobe earthquake, government assistance for homeowners was only available in the form of low-interest loans through a quasi-governmental banking corporation. Direct public support was available mainly for low-income and elderly households through the funding and construction of public housing (Maki, 2011).

However, political realities after catastrophic events, in particular the enormous public pressure on governments to provide public assistance for housing recovery, have ensured that this approach remains unfeasible in most instances. It is thus critical to manage expectations through a strong communication strategy that can explain what is possible and what is not to local communities impacted by a disaster. Understanding the housing needs of the impacted population, figuring out what tools local communities possess to avoid duplication and dependence, and working closely with impacted communities to craft policies that mirrors their needs and capacities are key.

There are other challenges identified with regard to government assistance as well such as public officials unprepared to deal with housing aid recipients and poor coordination and conflicting demands between various government agencies (Barakat, 2003; Boano, 2009; Ganapati, 2013). Increasingly, domestic and international nongovernmental organizations (NGOs) and other aid providers have filled the gaps or supplemented available public support. Following the 1986 earthquake in San Salvador, about 800 rent-controlled tenements (*mesones*), neighborhoods of adjoining one-story rooms or rooming houses that offered affordable rental housing options to low-income households, were destroyed. Public housing plans proved too expensive for the tenement dwellers. Instead, NGOs such as the Cooperative Housing Foundation of El Salvador provided the financing that enabled residents to purchase and rehabilitate their former rental units (Solo, 1991). The explosive growth and involvement of community organizations, grassroots NGOs, international NGOs, religious organizations, and neighborhood associations in housing recovery and reconstruction, however, comes with its own set of challenges. Critics warn that NGO services are geographically limited, spatially fragmented, and can exclude important subpopulations (Lake & Newman, 2002). NGOs are inherently undemocratic and unaccountable to the populations they serve (Harvey, 2005) and lack the responsibility of the State (Nijman, 2008). Past NGO-led housing recovery projects have also been criticized for building housing too far from jobs and sociocultural facilities, being poorly integrated into the preexisting built environment, providing top-down contractor-built cookie-cutter housing units, and excluding local involvement.

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Given the realities of public pressures and limited public and private funds, it is critical to craft a systematic approach to fund housing recovery. Neither the government nor the private market or nongovernmental entities can provide unlimited funds to replace housing loss after disasters. Although the context and circumstances of every disaster is unique and informs its recovery plans, a range of available options can be considered to meet the housing needs of different groups. For instance, affordable rental housing choices can be created while addressing the complexities of the rental housing market following a catastrophe. Policy framework can include a combination of approaches such as rental vouchers for temporary accommodation, public financing for short- and long-term rental housing, public-private partnerships to provide housing options to low-income renter households and to meet the need for affordable housing (Mukherji, 2011, 2015).

Planning to Rebuild and Planning for Housing Recovery

The process of planning to rebuild communities following a disaster is closely tied to planning for housing recovery as housing is linked to land use, infrastructure, and community development. Nevertheless, post-disaster housing recovery is predominantly treated as a separate sector and the broader aspects of housing such as its relationship to land, its connection to the housing market and economy, and links to the social fabric of a community are often overlooked during post-disaster recovery planning.

The separation of housing from other aspects of recovery planning begins immediately even as damage assessments are being conducted as evidenced by the post-disaster needs assessment model. The Post-Disaster Needs Assessment (PDNA) has become a standardized exercise that is increasingly conducted by national governments seeking external funding for recovery following a disaster. The European Commission, the United Nations Development Group (UNDG), and the World Bank have designed its guidelines. The PDNA report is widely used as the base document to determine international assistance and to inform recovery plans. The exercise and the report are divided into thematic areas or sectors such as agriculture, commerce, education, environment, health governance, housing, water and sanitation, and transport. Completed PDNA country reports from previous disasters indicate that the thematic areas rarely coordinate among themselves during the PDNA exercise as each sector reports to the top through a hierarchical vertical chain of communication. The sectors reach out to interest groups in their own area but rarely cut across boundaries to talk to one another, effectively creating a silo around each thematic area. The housing sector in a PDNA report focuses on items such as the number of units partially or fully damaged, the number of houses to be reconstructed, the cost of debris removal, temporary shelter provision, and housing reconstruction implementation strategies. While the PDNA general guidelines outline some potential land issues linked to housing recovery, the PDNA reports by themselves barely focus on the connections among housing, land and infrastructure, local economy, and the links to community fabric that could impact recovery planning and implementation. Rather than meeting the needs of the impacted communities and understanding local capacities, this approach is geared to meet the information requirements of funding agencies and justify a country's request for post-disaster assistance.

The disconnect carries over into implementation and impacts housing recovery. After the 2001 Gujarat earthquake, the first of the three installments of public assistance for housing recovery to individual homeowners was released in urban areas in June 2001. As long-term urban development plans were not yet complete at that time, property owners were not able to apply for building permits to begin housing reconstruction. In Bhuj, one of the impacted urban areas, the development planning process took almost three years to complete. In the meantime, impacted property owners did not know where their

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housing plot lines and road layouts were located and could not begin rebuilding without appropriate permits. Most households spent the first installment of housing assistance on other immediate household needs or medical expenses instead of on housing recovery. It was difficult for these households to then access the second installment of public assistance without proof of rebuilding progress (Ganapati & Mukherji, 2014). The lack of coordination between housing recovery and urban development planning created hurdles that could have been possibly avoided if housing recovery was closely tied to the larger recovery planning processes.

The disconnect between planning for rebuilding and planning for housing recovery reflects the way in which post-disaster housing recovery is treated rather narrowly as an end product with the goal to replace or rebuild the number of units damaged or destroyed rapidly. Indeed, the immediate response after a disaster among impacted communities is to rebuild homes quickly. Yet, housing recovery is also a process where inclusion of relevant stakeholders in housing recovery planning and coordination among multiple interlinked and overlapping areas such as housing, land use, and economy are some of the key elements of the process that can improve the quality of housing recovery. But the time frame needed for such processes conflicts with the urgency to rebuild housing swiftly, creating tensions during recovery planning. As a result, the broad and vital but also time consuming and messy processes of housing recovery planning are in reality often brushed aside in the rush to rebuild quickly or ignored altogether due to changing political, economic, or other considerations.

Within the disaster recovery community including housing recovery, “building back better” and “resilient recovery” have emerged as key themes. Yet, housing recovery planning and implementation remains disconnected from other areas of recovery planning, and the tools and measures of housing recovery are still the same. The emphasis on quantitative measures of housing recovery such as the number of units rebuilt and the cost of rebuilding heavily outweighs qualitative processes such as participatory recovery planning that could actually lead to “building back better” and “resilient recovery” outcomes. There is some good news. Non-profit organizations and academic research has begun to draw attention to these very issues through independent reports and publications that address this long neglected but critical aspect of housing recovery planning.

Crafting Need-Based Housing Recovery Policies and Programs

The period of post-disaster recovery is one of heightened activity and housing recovery is a complex and challenging process. Examples of governments crafting comprehensive housing recovery policies after disasters that address the housing needs of all groups are rather few. There is also a certain dissonance in public policy approach to post-disaster

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housing recovery as government response can be uncoordinated and ad hoc. Moreover, successful post-disaster housing recovery is widely evaluated in terms of the number of housing units built and repaired and the cost of rebuilding, while other critical measures such as public participation, access to adequate infrastructure and services, and land issues are barely discussed. Most importantly, while post-disaster funding and resources are limited, the frequency and impact of disaster events have increased over the last several decades. As growing number of housing stocks are exposed to environmental hazards, the most vulnerable populations are hit the hardest by disaster events. Indeed, those with assets and resources usually experience greater absolute loss (i.e. absolute in terms of damage amount) but lower relative loss (i.e. loss relative to total assets) during a disaster, whereas the most vulnerable have limited assets and experience lower absolute loss but higher relative loss (i.e. might lose everything they possess) during a disaster (Wisner et al., 2004). Socioeconomic vulnerable groups such as women, ethnic and racial minorities, renters and residents of multifamily structures, informal settlements, and manufactured homes face additional barriers and are slower to repair and/or rebuild their homes (Comerio, 1998; Fothergill & Peek, 2004; Kamel, 2012; Kamel & Loukaitou-Sideris, 2004; Kates et al., 2007; Mukherji, 2010; Oliver-Smith, 1990; Peacock et al., 2014; Tierney, 2007; Zhang & Peacock, 2009). Given these realities, it is important to pursue housing recovery policy and programs that go beyond the current paradigm and apply their limited resources in the most efficient and impactful ways. One such approach is to target post-disaster housing recovery resources based on need and not just loss. Need-based post-disaster recovery policies can be crafted to target a range of housing, including housing that especially needs assistance after disasters such as low-income rentals, informal settlements, manufactured homes and multifamily housing. In contrast, loss-based methods are narrowly focused as they mainly target single-family or owner-occupant housing and rental property owners.

Current knowledge of the field suggests that more effort is needed to match recovery programs to local housing market conditions, to find varied sources of capital for repair and reconstruction, to target government programs to meet a wide range of local housing needs and conditions, to ensure community participation in reconstruction efforts, and to limit loss of housing stock through mitigation. A systematic approach can be achieved through a comprehensive housing recovery policy with the following broad guiding principles. These principles include focusing on the varied housing needs (i.e. renters, long-term leaseholders, residents of manufactured homes, and informal settlements) of an urban population to create a more broad-based housing recovery approach, understanding housing needs after a disaster event in order to create programs tailored to local housing conditions, exploring creative funding options to fit a wide range of housing needs, improving the housing recovery process through community participation in decision making, providing households ownership of their recovery, linking housing to economic recovery, and mitigating future housing loss.

1. Focusing on broad-based housing recovery. Housing recovery programs and public assistance have been faulted for exacerbating socioeconomic inequities by ignoring the housing needs of a large percentage of the urban populations impacted by a disaster. Recognizing the necessity to address housing recovery needs of not just homeowners but also other housing groups such as renters, informal housing residents, households sharing space in a housing unit, residents of manufactured homes and low-income affordable rentals would be the first step in addressing such concerns.

2. Pursuing a needs-based approach. The focus of post-disaster housing recovery programs has been on the provision of shelter through rapidly constructed housing units, rather than a holistic approach to housing that looks at factors such as location, access, services, land tenure, and social and community structures. Instead of policies aimed solely at replacing lost housing units or rapid distribution of assistance, an understanding of shelter and housing needs among different groups would be an important component of a needs-based approach to housing recovery.

3. Assessing local housing market and housing needs. Understanding post-disaster housing needs is a highly local exercise. There is a general lack of knowledge about short- and long-term housing needs in post-disaster situations. Recovery programs often do not match local housing needs and are poorly coordinated with various agencies involved in the housing recovery process. Different programs may have competing agendas or different priorities with different timelines that are out of sync with the needs of the local community. To combat the fragmentation and disorganization observed during post-disaster housing recovery, housing policy after disasters has to be based on a thorough assessment of the local housing market and by carrying out housing needs assessments block-by-block and neighborhood-by-neighborhood among communities impacted by the disaster.

4. Exploring funding options. Multiple solutions are necessary to address the complexity of post-disaster housing needs among varied housing groups (e.g. homeowners, low-income renters, and informal housing residents) and indeed, even within each of these groups (as none of the groups are homogenous entities), each with a range of vulnerabilities and capacities. This would entail a policy framework that is based on a combination of methods and approaches providing access to a range of available funding options such as public-private partnerships, low-interest loans, micro-finance, and public subsidies to re-house post-disaster populations. It would also require crafting public assistance programs according to the needs of different housing groups and not as a one-size-fits-all package.

5. Improving recovery process through community participation. The history of post-disaster housing is replete with problems of poorly planned housing resettlement programs that rely heavily on expert knowledge and do not incorporate the values and requirements of the impacted population. There is a growing body of knowledge on the importance of civil society and community networks in post-disaster recovery. People prefer staying in their own familiar neighborhoods and communities after disasters; moving people from locations close to their jobs and other services does not work, as relocated households generally face socioeconomic challenges with regard to income, employment, and community networks. It is important to keep communities together and in their neighborhoods by minimizing resettlement or relocation after disasters. Community participation in decision making, which has social- and process-related benefits, would be the way to decide whether relocation is absolutely necessary such as in tsunami or flood hazard zones to ensure positive rebuilding process and outcomes.

6. Providing households ownership of recovery. Perception of post-disaster housing recovery can vary among households. Housing recovery programs where households are given the choice to rebuild themselves with the ability to access technical, material, and financial assistance have a high level of satisfaction as opposed to those who are not given this option and are provided a cookie-cutter unit through mass housing construction projects that might not be socioculturally, climatically, and economically appropriate. It is important to provide households with ownership of their recovery by putting complete control and decision-making powers in the hands of impacted households regarding their choice of building materials, construction process, and the house design within the larger parameters of safe building codes and zoning guidelines.

7. Linking housing to economic recovery. There is growing evidence that underscores the importance of housing in the resumption of basic economic activities. Difficulties in housing repair or reconstruction are linked to slower long-term economic recovery of households and communities. Housing recovery thus needs to be framed and understood in terms of long-term economic recovery of a community.

8. Mitigating future housing loss. It is vital to include mitigation strategies into post-disaster housing recovery through building codes, zoning ordinances, land use planning, and development policies. Hazards such as floods and storms particularly impact low-income housing such as informal housing and manufactured homes located in floodplains and other hazard risk areas. The need to reduce vulnerability and implement mitigation is thus more urgent for low-income affordable housing. Flexible policies that create incentives for mitigation and accommodate change are sorely needed to replace rigid narrow regulatory approaches along with more inclusive participatory planning approaches.

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