



## Cash in a housing context: Transitional shelter and recovery in Japan



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### ABSTRACT

This paper presents city dwellers and local authorities with questions that international humanitarian organisations (IHOs) may not ask after massive housing destruction. We examine Japan's transitional shelter strategy following the 2011 Great East Japan Earthquake and Tsunami (GEJET) against these questions: who decides when and where to build housing; what is built, how and by whom; who finances, owns or rents; and how might such conditions affect disaster response?

The analysis puts strategy in context by combining data on housing, subsidies and insurance, rather than presenting shelter delivery in isolation. In Japan, systemic housing-related vulnerabilities preceded the GEJET; shelter was a time-limited accommodation service; and cash hand-outs were not a cultural norm, not intended to be sufficient and never equivalent to the cost of temporary housing units.

We argue that such analysis is needed to challenge IHO thinking and uncover specific historical, regulatory and personal housing trajectories following a disaster.

### 1. Introduction

The controversial role of international humanitarian organisations (IHOs) in meeting post-disaster shelter needs has been described as “intractable” [33]. We argue this diagnosis stems from, and is reinforced by, the framing of IHO decision-making dilemmas. This framing forces a focus on unit costs, delivery speed and family shelters. These indicators are then compared between IHOs or between countries without an examination of prior housing processes and the systemic context that give them meaning.

We argue that these indicators do not allow scrutiny of decisions or nuance in understanding vulnerability and relegate accountability to post-hoc checklists against which aid beneficiaries might hold IHOs to account on procedural or technical grounds. We argue that a fair challenge to the strategic prescriptions of IHOs by local authorities and city-dwellers, requires that decisions be framed by an analysis of prior housing processes. We propose a series of questions that might underpin such an analysis: who decides when and where to build housing; what is built, how and by whom; who finances, owns or rents; and how might all this be relevant to disaster response?

We apply these questions to analysis of the government of Japan's transitional shelter strategy following the Great East Japan Earthquake

and Tsunami (GEJET). These questions allow the strategy and data to be placed in the context of ‘normal’ housing and ‘normal’ temporary housing processes in Japan.

The GEJET destroyed or damaged 620,802 homes and 561 square kilometres of land along the Tohoku<sup>2</sup> coastline [11,21]. It caused direct economic losses of USD 210bn and - as of 2012 - 19,000 fatalities [57,76]. However, it is easy for an IHO audience to dismiss this case as irrelevant on the basis of unit costs or delivery speeds of temporary houses. The relevance of the case study is that it places the GoJ strategy in context which, we argue, should be an approach in any setting and, particularly, where there has been massive destruction of housing in urbanising areas. The paper sets out to give meaning to the relief effort by examining prior housing processes, the intention of transitional shelter (an in-kind, time limited service), other household support and other recovery activities. The GEJET case study is possible because data on housing conditions and attitudes before and after the disaster have been documented. This allows household shelter choices to be examined in light of both what was normally expected of government and what was publicly assumed to be possible. It is valid to suggest that the regulatory power, institutional knowledge and data available in Japan may not be available in the same format (in English, online) in other contexts. This knowledge is often held in different parts of government,

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amongst construction professionals and by municipal leaders. This certainly makes it harder – certainly for IHOs working in isolation – to answer the questions posed in the paper but it does not mean they should not be posed.

We focus on three prefectures where 102,345 homes were completely destroyed: Iwate (20,998), Miyagi (65,462) and Fukushima (15,885). We draw on a variety of publicly available data and literature (limited to resources available in English) from before and after the GEJET, key informant interviews during the May 2013 EEFIT mission and early findings from a November 2014 Sasakawa Foundation-funded research trip. In order to evaluate the real economic costs of transitional shelter relative to housing and other aspects of recovery, the GoJ's transitional shelter strategy is placed in the context of Japan's housing policies, housing industry, previous experience of disasters and the role of the state in disaster recovery. We also look at differences between what was expected and planned by government and accepted and chosen by households during the response.

The government originally planned support for 116,000 affected households: 52,000 (46%) temporary housing units and rental subsidies for what was expected to be up to 63,000 (54%) publicly owned housing units. Our analysis shows that, as the response unfolded, 136,000 households received support: 52,000 (38%) moved into temporary housing, only 18,000 (13%) into public rented housing but the majority, 66,000 (48%) households, opted to use the subsidy to rent private accommodation. These proportions varied significantly between prefectures and we argue that this was a result of specific, local housing processes.

The government subsidised rental accommodation using conditional cash transfers. Our analysis shows that cash subsidies must also be seen in the context of prior norms, other public and private spending and with an understanding of shelter-related vulnerability. These data are rarely combined in the analysis of post-disaster shelter projects. In this instance, conditional cash transfers were not set by making them equivalent to the amount spent on temporary housing units. This was to avoid rent inflation, overspend and inequitable outcomes for different households in different places.

The paper closes with the key points of analysis aimed at those who wish to challenge shelter plans put forward by IHOs. We argue that the questions put forward underpin a better understanding of post-disaster shelter decisions than conventional evaluations focused only on shelter delivery. In cities at risk of a massive destruction of housing, these questions will support local authorities, universities and technical professional bodies in their encounters with IHOs and in articulating the housing processes that were “in train before, and continue after, humanitarian history begins at the moment of disaster” [66]. We conclude that only by exposing the specific historical, regulatory and local housing processes that unfold after a disaster, can deliberation around an event be properly interrogated and decision-makers held to account.

A note on terminology: The term transitional shelter is used to describe the overall policy approach in Japan because this is the terminology adopted by the Government of Japan in sharing lessons learned from the GEJET [87]. The temporary, collective shelters where people initially sought refuge are called evacuation centres<sup>3</sup> and pre-fabricated housing units are called temporary housing or temporary houses.

## 2. Context-free dilemmas: the international framing in the debate on shelter and housing after disasters

### 2.1. IHO dilemmas

To make a case for our questions, it is important to understand how

<sup>3</sup> Evacuation structures and evacuation centres are not covered here. Chapter 10 and Section 11.1.5 of the 2011 EEFIT Report deal with this issue as do other recent articles [21,75]013).

IHOs frame the problems they face in responding to a shelter crisis. We characterize this framing as a set of dilemmas over material ‘stuff’ [53]. By using the term ‘stuff’, after Miller, we want to provoke a shift away from the notion of shelter as a man-made object and towards the idea that the stuff of homes is not just made by people but also shapes us. The repeated representation of shelter as a generic shed-shaped object means that what is discussed, designed and delivered remains nothing more imaginative than a glorified (and imported) garden shed. This is not a playful point: if cities are the setting of future disasters, shelter as ‘just a bunch of stuff’ – when its full importance is not acknowledged – is a completely mismatched and inadequate conception vis-a-vis homes and how they shape us.

The dilemmas are framed: what stuff, how is stuff delivered, who should deliver stuff, what is the appropriate value of the stuff? The dilemmas are illustrated in Fig. 1 to exaggerate the problem of a visual framing of shelter [69] – as symbol, icon and focus – since this serves to reinforce IHO decisions that are:

- Context free, in that the dilemmas apply regardless of where the humanitarian system deploys
- Focused on the shed-shaped shelter object as something independent of people, place and history
- Can be adjusted only in terms of unit cost, number, size and timing
- Measurable only by whether these parameters are harmonised across organisations or comparable from one disaster to the next

The effects of this framing are that:

- The dilemmas that are identified and best documented are technical (design) and organisational (coordination). For example, providing shelter after disasters is described as: “one of the most intractable problems in international humanitarian response” because “arguments between experts over design, quality and cost can slow the process, and weak coordination in the sector often leads to a wide variance in what is provided” [33]
- The unit cost of the shelter product comes to be regarded as a logical indicator for monitoring and evaluating the performance and equivalence of IHOs and as an informative indicator, even when it is reported in isolation [2–5]. This feeds back to reinforce a focus on the technical dilemma: designing a household aid bundle – often a pre-fabricated shelter kit – within this unit cost constraint [15].
- Any outstanding ‘intractability’ is framed either as a bureaucratic dilemma common across sectors, whereby money for an emergency is governed separately from money for longer term recovery and reconstruction, or as a humanitarian dilemma, specific to shelter response, whereby the minimum bundle of shelter that might ‘save lives and alleviate suffering’ may amount to a high value per household [86] or may be hard to target to the most vulnerable ([77], p. 18).

We contend that this masks underlying questions about context: what might be valuable to whom, when and why.

#### 2.1.1. Cash: theoretically resolving technical and organisational dilemmas

In a number of settings, IHOs have used working groups to resolve technical and organisational dilemmas by making collective decisions on what should be provided and how it should be delivered in the immediate aftermath of a disaster [29]. IHOs are also exploring cash transfers in humanitarian settings. In theory, cash might resolve the technical dilemma by forestalling arguments about design since cash is fungible – meaning that it can easily be exchanged by a household for designs, goods or services of their own choosing – rather than limited to a shelter product. It might also resolve the organisational dilemma because it is easy to achieve and report parity between IHOs by fixing the cash amount. The evidence on the merits of cash versus other forms of aid delivery in the shelter sector is limited [86] but the IHO discourse

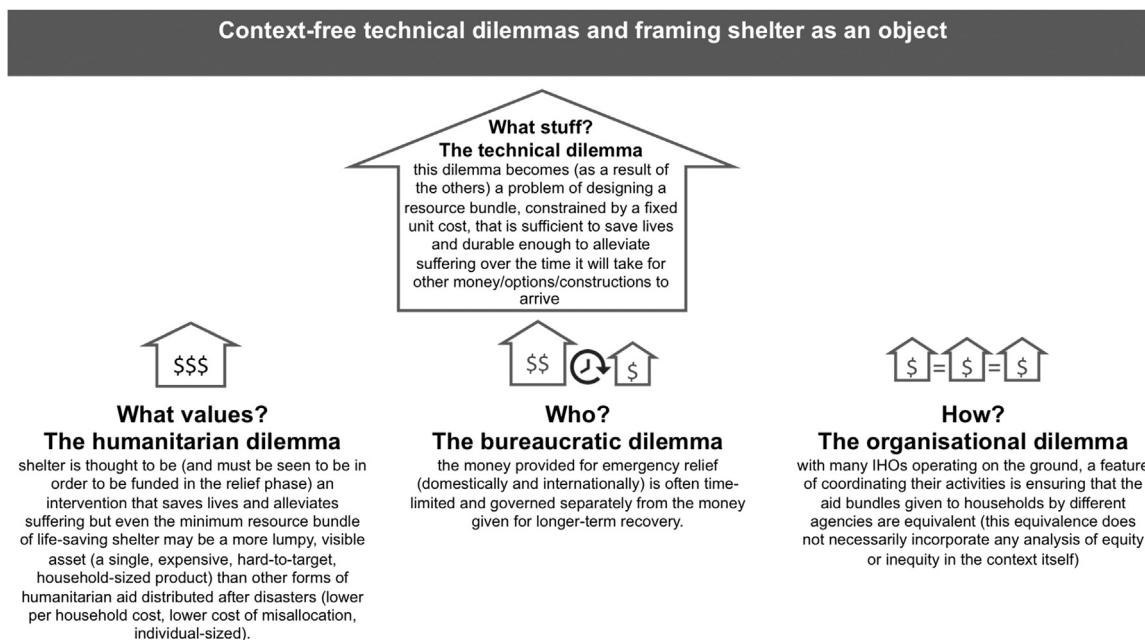


Fig. 1. Context-free framing of problems seen from the perspective of international humanitarian organisations.

tends to conflate two areas of perceived risk. First are risks associated with IHOs organising themselves: the World Bank and the Global Shelter Cluster, for example, identify the inability of IHOs to analyse housing, rental and construction markets or borrowing and financing mechanisms [28,86]. Second are “intractable”, difficult or dangerous risks associated with giving cash where there might be uncontrolled quality and safety of buildings [59,86] or complex “wider needs” and “tenure issues” [71]. There is also a general concern around the ‘misuse of funds’ [30] that is thought to be magnified by the ‘high-value payments’ associated with shelter [86]. This paper puts monetary value of shelter and recovery costs in the context of norms around cash and housing.

2.1.2. Transition: partially resolving the bureaucratic dilemma

The transitional shelter and settlements approach [79,80] – the terminology used by the Government of Japan in their joint publications with World Bank [88] – can be seen as an attempt to resolve the bureaucratic dilemma – a dilemma that formulates and separates the ideas of urgent response and longer term recovery. Transition captured the idea that people who lose their homes, flee or seek refuge, have to find alternative accommodation until they can return to repair or decide to resettle [63,69,80]. Criticism of the transitional shelter approach is often conflated with criticism of the use of pre-fabricated shelters; pre-fabricated shelter kits are often called “transitional shelters” even though such shelters might be just one component of a transitional shelter response. As a consequence, well documented criticism of pre-fabricated kits by IHOs has emerged to argue that they are intrinsically limited: in scale because they are expensive, thus limited in number; in scope because uniform floor areas and single storeys are only suitable in some locations and for some households, compromising the objective of equity (e.g. where households with access to land can more easily claim a shelter kit) [14]; problematic for people who prefer not to “transition” a kit by improving it or moving it, but are seeking transitional alternatives, for example, rental accommodation elsewhere [15]; in the limited possibilities they offer for building local capacity [49,68] and addressing the reality of building practices [47,48,9]; and in any positive impact on local economic recovery [12,13,82]. This critical focus on the shelter object means that transition is also concentrated on the object rather than the people affected by the disaster. The technical dilemma then revolves around upgrading or moving the

shelter object [66].

This paper puts post-disaster transition in the context of pre-disaster housing processes and what is expected, accepted and subject to change after a disaster.

2.1.3. Process and standards: trying to resolve the humanitarian dilemma

As the focus on the shelter object persists, it also reframes the humanitarian dilemma which becomes preoccupied with: how much shelter saves life; how many shelters can be provided; and, then, which people are most likely to have their lives saved/suffering alleviated by a shelter? This apparently logical sequence of questions is in tension with addressing the needs of the most vulnerable. A humanitarian imperative requires the logic to be reversed so that we start by asking who is most vulnerable and then ask where the most vulnerable find themselves and what their processes of seeking shelter look like. This logic is impossible to answer in a context-free frame because it partly depends on who was most vulnerable before the disaster, where the most vulnerable lived and what their housing processes looked like.

The struggle to resolve this humanitarian dilemma has led to recent calls to consider: post-disaster shelter as a “process not a product” [17,37]; the setting of “appropriate” and “acceptable” shelter and settlement standards with reference to existing norms [73]; and a renewed emphasis on baseline assessment, not just of post-disaster needs, but of capacities that are technical (e.g. knowledge about service delivery) and functional (e.g. creation and management of policies and legislation) [26,27]. In line with this latter point, the World Bank's new Disaster Recovery Framework (DRF) consistently distinguishes between public and private goods as a way to assign responsibility and allocate resources after a disaster. Housing, on this view, is problematic: it is ostensibly a private good but, when responding to large-scale housing losses from disasters, it often takes precedence because of its importance for recovery and “direct impact on affected populations” (GFDRR et al., 2014). The DRF thus asks for legal clarity over the degree of responsibility taken by governments or other institutions for repairing or replacing private housing assets, restoring critical public infrastructure, subsidising or facilitating housing recovery and relying on private insurance.

We suggest that any housing process has grey areas in terms of what is public or private such that legal – and political – uncertainty over these questions give any ‘normal’ housing process some intractable

features long before post-disaster shelter becomes an “intractable problem”.

## 2.2. Shifting the focus

Our analysis of the GEJET strategy is in deliberate contrast to the context-free framing of IHOs. Only in this way can we understand: why pre-fabricated temporary housing was an important part of Japan's response; why cash was important but transfers were conditional, time-limited, deliberately insufficient and exceptional; and what legal definitions of the public and private components of housing lie behind Japan's transitional shelter strategy.

The analysis is organised as a series of questions about prior housing processes missing from the context-free framing:

- Who decides when, where and what to build;
- How is housing acquired and who builds it;
- Who pays; who owns and who rents; and
- How do prior housing and disaster processes affect different households and places after a disaster?

Section 3 sets out these conditions prior to 2011 and Section 4 discusses how these factors affected Japan's transitional shelter strategy after the GEJET and their relevance for translating lessons.

## 3. Demonstrating the significance of prior housing processes: the Japanese government's response to the GEJET

The following sections show that who decides, who builds, and who pays are related not just to individual families but to a larger historical, political and industrial context by drawing on literature and fieldwork [20]. We argue that these prior housing processes informed the Government of Japan's strategy, affected geographic differences in the take up of each option and helped to explain differences between what the government originally anticipated and what households preferred [87].

### 3.1. Who decides when, what and where: strategic options and household choices

The Government of Japan (GoJ)'s Basic Guideline to Recovery after the GEJET prioritised a regional approach to planning, setting a broad, high-level framework that allowed for different local options. This high-level framework supported three large-scale programmes in the prefectures affected by the GEJET:

- Support for people to move into private rental housing. Information on available units was provided by the Centre for Information on Public Houses for the Affected, set up by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) on 22nd March 2011; a rental subsidy was paid directly to the disaster-affected tenant household for up to 2 years which was extended by 12 months in April 2012 [6]
- Temporary housing units. Procurement was financed by the national government, production and construction was sub-contracted to manufacturers by the prefectural governments [11] and site selection and planning permission was by municipal governments.<sup>4</sup> These units were intended and specified for a two-year period of occupation as per the Disaster Relief Law.
- Making government-owned or public housing available as rental accommodation.

#### 3.1.1. When and what: definitions, regulations and expectations

The strategy of the GoJ was based on allocations and time periods

enshrined in regulation. These conditions form a backdrop to the GEJET disaster response, framing what was exceptional and what was a continuation of prior housing norms. Japan's regulatory framework anticipates government and household decisions after a disaster in several ways [19].

Firstly, the Japanese national government has responsibility for recovery (*fukkyū*), which traditionally means clearing debris (including from private land) and restoring important public infrastructure. The government does not have a responsibility for private property, economic or individual recovery. The government is accountable for making reliable and public estimates for the time needed and delivering against these targets, as exemplified by the publicly announced estimates for the amount of debris that would need to be cleared [61]. Secondly, norms are based on principles of self-reliance [36] such that taxpayer money cannot be used to rebuild private property or to subsidise the development of private property, including the building of temporary housing on private land. Thirdly, the provision of temporary housing made available free of charge is preferred over distributing cash because the former can be considered an “in kind” welfare benefit for those who have lost homes (by interpretation of the Disaster Relief Law). Priority is given to the vulnerable and temporary housing is expected to last for two years (interpretation of Building Standards Law) [87]. Finally, insurance – though efficiently and quickly administered – has not and will not represent a significant flow of private investment into reconstruction with a residential insurance penetration in 2010 of 23.7% [25]. Therefore, the public know in advance that the government support for the recovery of private housing assets is limited in value and duration and that household resources for private reconstruction will depend on a mixture of government support, individual savings or assets and a household's eligibility or ability to borrow.

#### 3.1.2. Who decides when and where: national policy and local contexts

The volume of new housing produced in a ‘normal’ year gives an indication of the housing sector's capacity to respond after housing has been destroyed. The number of housing units damaged was approximately an eighth of annual completions nationally.

These high completion rates have been a feature of Japanese housing for sixty years. One third of completed houses is commissioned by individual, owner-occupiers. Completions are comparatively high. In 2010, for example, Japan had six times the completion rate of the UK rate for just twice the population (Fig. 2).

Significant drivers of these high rates have been the government's tendency to manage the national economy through housing policies (e.g. stimulating economic recovery via backing low-cost house building loans [34,64,7] and accompanying policies designed to facilitate permits to build [56]. This has also shaped tenure arrangements: about 60% of housing has been owner-occupied since the 1960s, around 25% is privately rented and 7% is let by the public sector. Before WW2 these figures were reversed but low-cost lending via the Government Housing Loan Corporation (GHLC) has actively promoted homeownership [34]. Private renting has not been subsidised in the same way [64] and these units tend to be smaller with evidence suggesting that, even during deflation, private rental has become more expensive and more insecure even as the rental stock has aged and fallen into disrepair. Fig. 4 illustrates the relationship between floor areas and tenure arrangements in Iwate, Miyagi and Fukushima.

Some temporary housing and rental subsidies have existed, for example, where housing is provided by companies to their employees [34] but the relatively small amount of publicly owned housing with subsidised rents is targeted only at those “unable to help themselves”, based on income and welfare criteria (elderly, disabled, single-parent families). These prior conditions have led to public housing being associated with social stigma and a geographic concentration of disadvantage where there are fewer local resources for community support or communal activities like basic upkeep [36]. Meanwhile, even as

<sup>4</sup> Key informant interview, Arup 8th June, Tokyo.

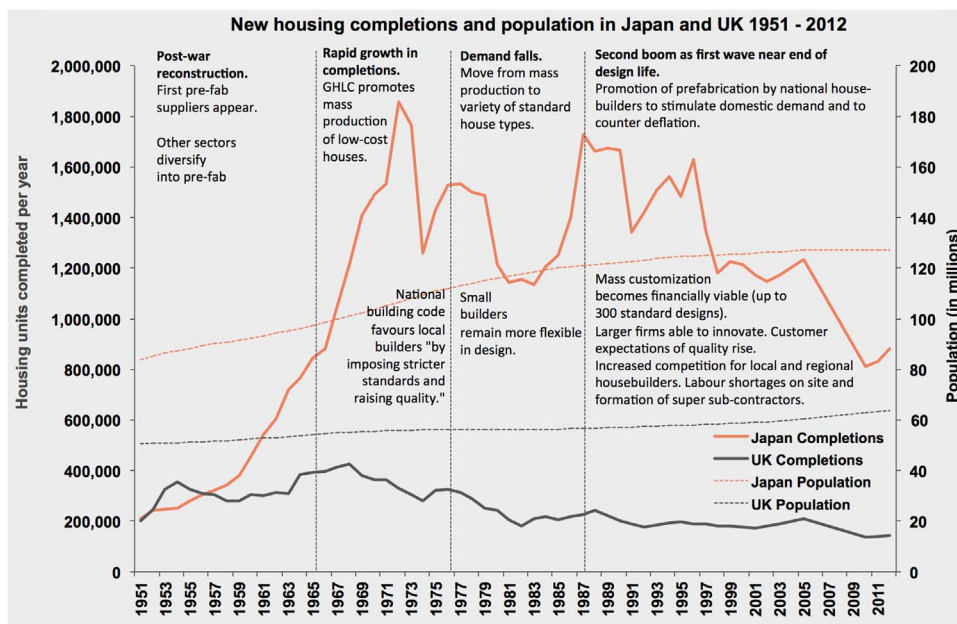


Fig. 2. Annual rates of house completions in Japan [40] with UK rates for comparison [18] and annotated with the history of pre-fabricated housing Japan summarised from [39,8] and population data from [83].

Table 1 Summary of shelter strategy showing numbers supplied and numbers chosen.

	By July 2011 [11,87]		By December 2011 [1]	
	Number of houses allocated or chosen	Number of houses supplied	Number of houses allocated or chosen	Number of houses supplied
Temporary housing		37,962	52,182	52,620
Government-owned			9832	38,464
Public housing	7010	28,100	8238	24,505
Private rental	42,300		65,692	
<b>Total</b>	<b>49,310</b>	<b>66,062</b>	<b>135,944</b>	<b>115,589</b>

mirrored in the transitional shelter strategy and its take up after the GEJET. We argue that public housing was prioritised in the strategy because of learning after the Kobe earthquake where it was initially overlooked but later understood to be the only option for an elderly, low-income population stuck and isolated in temporary housing.

Temporary housing in Kobe following the 1995 Great Hanshin Earthquake drew national and international criticism. The regulatory framework provided for 29,278 (plus 3168 outside Kobe) temporary housing units intended to last for 2 years. The response demonstrated the impressive post-disaster capacity for delivering temporary housing with reported figures of 4000–6000 units per month [35]. However, by April 1998, three years after the earthquake, 45% of temporary housing was still occupied; about 14,000 households, predominantly comprising elderly and low income people, were stuck in isolated, cold, noisy,

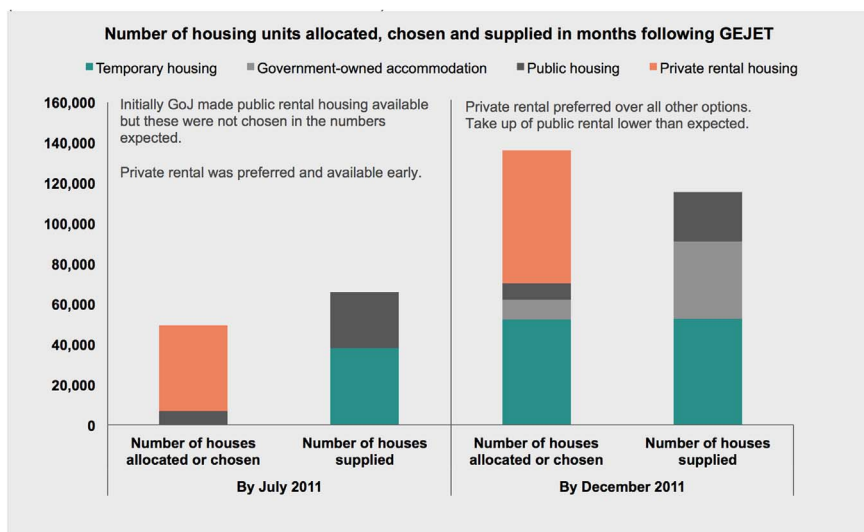


Fig. 3. Graphical summary of shelter strategy showing numbers supplied and numbers chosen [11,87].

wider economic changes have eroded the asset value of land and housing, home ownership remains a tenure aspiration [64] and market interventions that might stimulate the supply of low-cost private rental housing options are limited [36].

Both the stigma of public housing and antipathy towards renting are

small (20–26 m<sup>2</sup>) pre-fabricated housing units with no communal facilities, often on the outskirts of the city. This appeared to result in higher incidents of 'kodokushi' or "solitary and initially unnoticed deaths" [32,44]. This prompted a policy change designed to open up housing options by increasing the target number of newly reconstructed

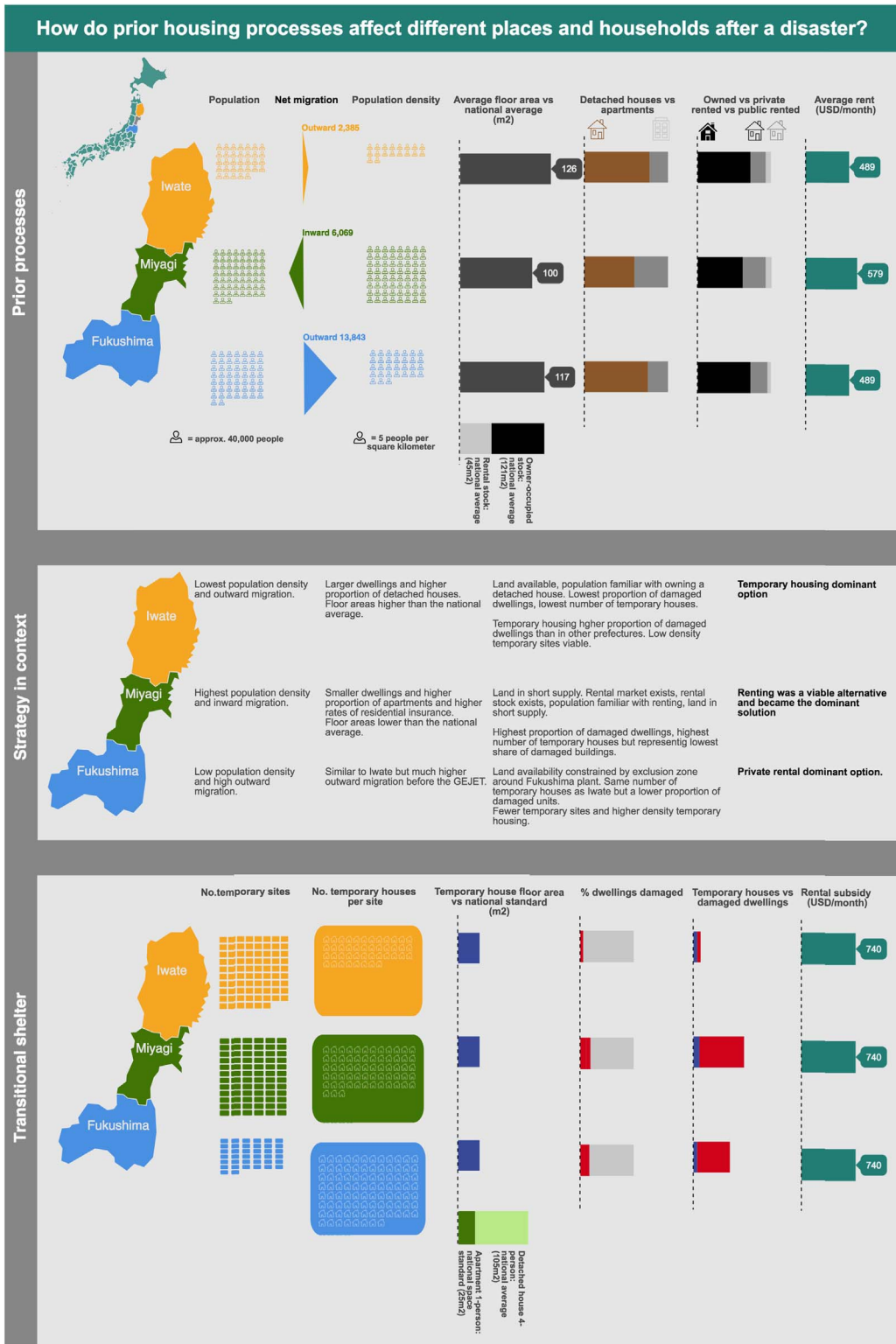


Fig. 4. Prior process and transitional shelter infographic.

public housing units, rates of repair and rehabilitation and rental subsidies. Breaking with prior housing norms, the government also subsidised private rental housing (leased by government and let at subsidised rents). Despite these efforts, some of the problems associated with 'normal' housing policies carried over into the post-disaster housing logic [36]. Low-income renters and elderly homeowners lived in downtown Kobe's old, lower quality, wooden, multi-occupancy terraced housing, which was disproportionately damaged [19,35]. Elderly and low-income groups thus became concentrated in evacuation centres

and then in temporary housing. Planning in their parts of the city was delayed because plots were small, densely packed, had multiple owners and did not comply with more recent space planning requirements. Allocation of permanent public housing was slow. Therefore, these groups got stuck in their temporary housing and could not access loans to rebuild because they had lost their collateral (house) and income (rent) [19,32,35,72]. It was the prior, local and housing-specific vulnerabilities, correlated with age and income, that led to, amplified and protracted vulnerability of certain groups.

**Table 2**  
Shelter and Pre-disaster housing [40] and post-disaster housing [1,40,75].

Prefecture (population density)	Dwelling units % (of which rented: privately: publicly <sup>a</sup> )	Detached dwellings (% apartments)	Housing damaged fully, half, partially (% of total units)	No. temporary housing sites under construction by June	Temporary housing planned (average housing units per site, % local contractors)	Preferred option (World bank, 2012a)
Iwate (90 people per km2) – 2385 net migration	550,000 (18%:9%)	358,000(18%)	26,840 (5%)	312	13,833 (44, 18%)	Mostly temporary housing
Miyagi (321 people per km2) + 6069 net migration	1,014,000 (26%:10%)	515,000 (33%)	190,931 (19%)	358	22,453 (63, 1%)	Mostly private rental apartments
Fukushima (154 people per km2) – 13,843 net migration	808,000 (19%:6%)	513,000 (16%)	137,465 (17%)	152	14,000 (92, 33%)	Mostly private rental apartments

<sup>a</sup> Public rental in this estimate includes houses owned by the state, public corporations, the Urban Renaissance Agency and by employers

These factors presented the authorities with difficulties in equitably meeting (and being seen to meet) the needs of the most vulnerable. Thus, the supply of public housing was a key priority after the GEJET even if it was not taken up in the numbers anticipated by the strategy. The size of temporary settlements was also a concern. After the Kobe earthquake, inhabitants of temporary housing found themselves isolated in vast, impersonal sites [19,32]. Therefore, the GoJ adopted a principle of networked relocation, wherein people were encouraged to organise into groups of 5 households before being allocated temporary housing [87].

### 3.1.3. Who decides what and why: different housing choices

The take up of shelter options varied by location. Prior to the GEJET, the 500 km coastline was dotted with remote but proudly self-reliant fishing villages, marinas and tourist resorts, ports, industrial food processing facilities, a steel plant and several nuclear facilities. Generally, however, young people were migrating away from these areas, partly due to declining local work opportunities,<sup>5</sup> and, in line with national trends, the population was aging and urbanising, agriculture was in decline and youth unemployment was on the rise [60,90,91]. These factors and the geography of the coastline affected the population density, dispersal of settlements and availability of flat, undeveloped land [50]. This in turn shaped the number of sites that could be allocated for temporary housing and amount of rental housing available.

The amount of space available for transitional settlement sites<sup>6</sup> was highly constrained and varied by location. This caused local delays in finding space and securing land for temporary sites [87]. Flat coastal areas had more space than steep sided or previously uninhabited areas but had sustained more damage [5,88]. By April 2011, the government had prohibited rebuilding across large swathes of land [1] and with construction both legally and practically impossible (because of debris), sites for temporary housing were limited and sometimes at some distance from people's communities of origin [52]. In addition, there appeared to be a reluctance to occupy some designated sites for fear of tsunamis or other hazards [75]; while other spaces were needed for activities such as debris sorting or school facilities [42]. Compounding the scarcity of space was the difficulty of finding and then getting permission from private land-owners.<sup>7</sup> With sites scattered along the coastline, the average number of units per site was 44 in Iwate, 56 in Miyagi and 89 in Fukushima – dramatically smaller than the 1000 to 4400 housing units installed on vast sites on the outskirts of Kobe in 1995 [1,52].

Overall, the take up of private rental outstripped the take up of temporary housing (Table 1, Fig. 3). Take up of public housing was lower than anticipated; private rental was more popular due to its “lower prices, higher comfort, and greater versatility” [87]. Of the three prefectures, Miyagi prefecture (home to the city of Sendai) had the highest population density, rents, percentage of renters and percentage of these renters in public housing. It further had the lowest rates of detached, wooden and prefabricated housing; the lowest rates of home and land ownership; the smallest average floor areas and highest average rents (Fig. 3). After the GEJET, Miyagi had the highest percentage of totally collapsed housing and took delivery of the largest number of temporary houses. However, these temporary units represented only a low proportion of the damaged buildings and private renting was the preferred option. This suggests that sufficient rental stock remained and existing renters were more willing to rent after the

<sup>5</sup> Key informant interview, 6th June, community mobiliser Miura San, Oye District.

<sup>6</sup> The international humanitarian standard for covered living space recommends that “people have sufficient covered space to provide dignified accommodation...” where “essential household activities can be satisfactorily undertaken, and livelihood support activities can be pursued as required.” but emphasises that this must be appropriate and adequate for the specific context.

<sup>7</sup> Key informant comments, 20th November 2013.

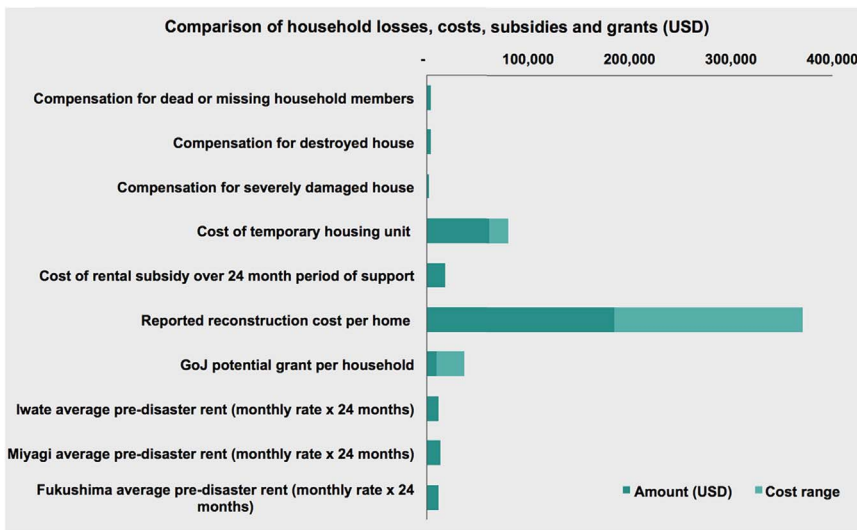


Fig. 5. Comparison of household support packages in Japan compiled from [21,23,40,52,62,87].

Table 3  
Comparison of household support packages.

Intended purpose	Source	Amount (USD) (max)
Compensation for dead or missing household members	EEFIT (\$year\$) [21]	4322
Compensation for destroyed house	EEFIT (\$year\$) [21]	4322
Compensation for severely damaged house	EEFIT (\$year\$) [21]	2223
Cost of temporary housing unit	Tender benchmark 5,000,000JPY [23] & 5,749,580 to 6,518,890 (IRP, 2012)	61,744 (80,500)
Cost of rental subsidy over 24 month period of support	1,440,000 JYP for 24 months [52]	17,782
Reported reconstruction cost per home	15–30,000,000 JPY [62]	185,231 (370,462)
GoJ potential grant per household	10% for mortgaged properties and 5% for those owned outright. Range taken as 5% of 1.5 m to 10% of 3 m JPY [62]	9262 (37,046)
Iwate average pre-disaster rent (monthly rate x 24 months)	[40]	11,727
Miyagi average pre-disaster rent (monthly rate x 24 months)	[40]	13,844
Fukushima average pre-disaster rent (monthly rate x 24 months)	[40]	11,742

disaster. Iwate had the lowest prior percentage of renters and the lowest population density, dispersed in smaller settlements on scarce flat areas of coastline. Here, pre-fabricated housing was preferred perhaps because it was seen as better than renting further afield or because those not renting before were less willing to become renters after the disaster.

The availability of space and the ownership of land and housing had long been linked to policy, topography and the regional economy. This was embedded in housing choices prior to the disaster and affected take up of transitional shelter after the disaster.

### 3.2. How is housing acquired and who builds: housing and temporary housing before the GEJET

The acquisition of ‘normal’ housing – its tenure, type and ease and speed of availability – is critical to the take up of transitional housing.

The first rental housing units were identified as ready or available within 11 days of the GEJET [52] while the first temporary housing units were nearing completion after 4–8 weeks. Within four months of the disaster, 75% of the 450,000 people who had sought refuge in evacuation centres had been able to move to alternative accommodation [87]. The pace of transitional shelter delivery was criticised [85] but was completed within 9 months.

In this section, we show that the rapid delivery of thousands of temporary houses was possible because of the size and capacity of firms manufacturing pre-fabricated housing and because prefectures had prior agreements in place with these manufacturers [87].

#### 3.2.1. Acquisition of ‘normal’ housing

In the years leading up to the GEJET, through the housing bubble of the eighties and the ‘lost decade’ of the nineties, land and house price inflation and deflation were experienced differently between cities and rural areas [58] and between people in different age groups [34,64]. Different housing types have come to prevail in different areas and different supply chain conditions have emerged to serve these different housing types (Table 2 and Fig. 4).

Overwhelmingly, Japanese housing is commissioned by individual owner-occupiers, rather than by large house-builders. This stems from particular land ownership structures and interventions outlined in Section 3.1.2. Land prices make up a significant proportion of housing costs [58,91], driven until the 1990s, by: family ownership of land, employment in one place for life, a “strong cultural attachment to the land” [41,43], laws protecting tenants and lessees [58] and parcelling and redistribution to small-scale tenant farmers after World War Two [91]. Land was perceived to be “a permanent commodity” but houses had “an ephemeral quality” and have been seen as transient objects that deteriorate, such that older houses become undesirably expensive to maintain and repair [64] leading to house values, at least outside major cities, depreciating over time like a consumer good [8]. These perceptions are possibly amplified by cultural and religious preferences for modernity and renewal [41,43,65].

These conditions - alongside cheap government-backed finance for house-building - contribute to a preference for newly built houses (80% of completions in Japan compared to 5% in the UK) and a disconnection between the value of buildings and the value of land. It also leads to a short design life of housing (20–30 years) [46] and a tendency to ‘scrap



**Table 4**  
Breakdown of losses and insurance by sector and coverage.

Parent field	Field	Source	Notes and estimate range (USDbn)	USDbn
	Total Losses	[16]	479–710	594.5
Total Losses	Direct Losses	[57,76]	210	210.0
	Indirect Losses		Total - direct	384.5
Direct Losses	Private Buildings	[89]	62% losses from private buildings	130.2
	Public Infrastructure	[89]	13% came from public infrastructure	27.3
	Other		direct - private (62%) - public (13%)	52.5
Private Direct Losses	Insured	[57,76]	35–40, 36	36.0
	Not Insured		Private buildings loss (130.2) insured (36)	94.2
Private Direct Losses	Private residential losses	[25]	Assuming national insurance residential penetration rate of 23.7%, back calculating from insured loss	~118.5
	Private non-residential losses		Private Losses - residential losses	~11.7
Insured Private Direct Losses	International reinsured	[76]	International Reinsured 23%, 8.1–9.2	8.3
	Other		Insured - national reinsured 26.9–30.8	27.7
Insured Private Direct Losses	Residential Insured	[89]	78% of insured losses, 27.3–31.2	28.1
	Non-residential (commercial, industrial) insured	[89]	22% of insured losses, 7.7–8.8	7.9
Private Residential Losses	Residential insured losses	[89]	78% of insured losses, 27.3–31.2	28.1
	Residential non-insured losses		Private residential losses - residential insured losses 91.2–87.3	90.4
Residential Insured Private Direct Losses	Residential losses covered by EIP managed by the private nonlife insurance companies	[89]	56% of residential asset losses, JPY1,200bn, approx USD15bn	15.7
	Residential losses covered by cooperative mutual insurers	[89]	15.3–17.5	12.4
EIP Residential Insured Private Direct Losses	retained by government (EIP's loss)	[89]	45% of residential losses covered by EIP, 6.9–7.9	7.1
	private insurance (EIP's loss)	[89]	42% of residential losses covered by EIP, 6.4–7.3	6.6
	JER (EIP's loss)	[89]	13% of residential losses covered by EIP, 2.0–2.3	2.0
EIP Residential Insured Private Direct Losses	Claims paid within 8 weeks	[38,88]	60%, 9.2–10.5	9.4
	Claims paid within 8–10 weeks	[38,88]	80% (80% – 60% for 2months – 10 weeks), 3.1–3.5	3.1
	Claims paid within 10–20 weeks	[38,88]	90% (90% – 80% for 5months – 2months), 1.5–1.8	1.6
	Not paid < 20 weeks		100%–90%, 1.5–1.8	1.6
Private residential losses	Paid through Government of Japan Reconstruction Grants	[54,55]	Sum of 2011, 2012, and 2013 from GoJ Budget, assuming 80.98 JPY to 1 USD	30.1
	Insured Residential Losses	[89]	78% of insured losses, 27.3–31.2	28.1
	Paid through other (mainly private means)		Private residential losses - reconstruction grants - insured residential losses 61.1 – 57.2	60.3

and build' [7] because high land costs leave less money available for investment in long-lasting buildings and older housing gradually becomes obsolete in terms of floor area standards and perceived seismic resistance<sup>8</sup> [46].

### 3.2.2. Acquisition of 'normal' pre-fabricated housing

These factors have structured the housing industry in ways that are critical to the strategic decisions made after the GEJET. With homeowners traditionally able to improve their housing by rebuilding in situ rather than moving [64] and the majority of house-building taking place on family plots, housebuilders have not traditionally made profit by speculating on land development but by innovating in the supply chain [8]. Since the 1950s, this has spurred the emergence of pre-fabricated housing from Japan's manufacturing sector (Fig. 2) and has affected the composition of building firms. Over 90% of firms remain small, local (traditional timber beam and post) contractors supplying fewer than 10 houses annually [39]. More than three hundred of the remaining 10% of firms have the capacity to deal with orders of at least 100 units. Among these big companies are names including Daiwa House Industry Co., Sekisui House Ltd. (founded in 1928) and Misawa Homes Co. Kitamura [45].

This means that before the GEJET, pre-fabricated housing manufacturers already supplied about 20% of the detached, family housing market, about 14% of all housing completions (160,000 units per year) [41,43]. Pre-fabricated homes had become a luxury, mass-customised

<sup>8</sup> wood-framed dwellings of one or two stories that were exempted from structural calculations are thought to lack seismic resistance.

commodity based on “standardisation (the complete and consistent interchangeability of parts) and preassembly of components and complete subassemblies (such as timber and steel-frame systems and external cladding)” [8] and Sekisui and Misawa alone were supplying 60,000 and 30,000 pre-fabricated units per year [7].

### 3.2.3. Acquisition of pre-fabricated temporary housing after the GEJET

Underpinning the post-disaster strategy of supplying temporary housing units was a pre-defined and harmonised national specification. This included criteria such as: a lead-time of 2 months; a 2 year after-care agreement; structural performance criteria<sup>9</sup>; recyclable materials; and fire insurance [23]. It further offered suppliers a lease option allowing units to be returned to the supplier after two years and set a minimum standard for floor space. These criteria had been decided within the context of pre-existing national space standards for housing [24] and data on the relationships between floor space, tenure and prefecture.

These pre-conditions did not entirely forestall problems on the ground. Despite its success in terms of speed, coverage, quality and cost control, the strategy faced challenges common to other transitional shelter strategies. For example, although the national government over-estimated the numbers of households that would accept a temporary house, the number of units procured outstripped the pre-positioned supplies and capacity to deliver. This put downward pressure on quality and upward pressure on costs [87]. In addition, the popularity of pre-

<sup>9</sup> 1 m snow loads and 30–34 m/s wind speeds.

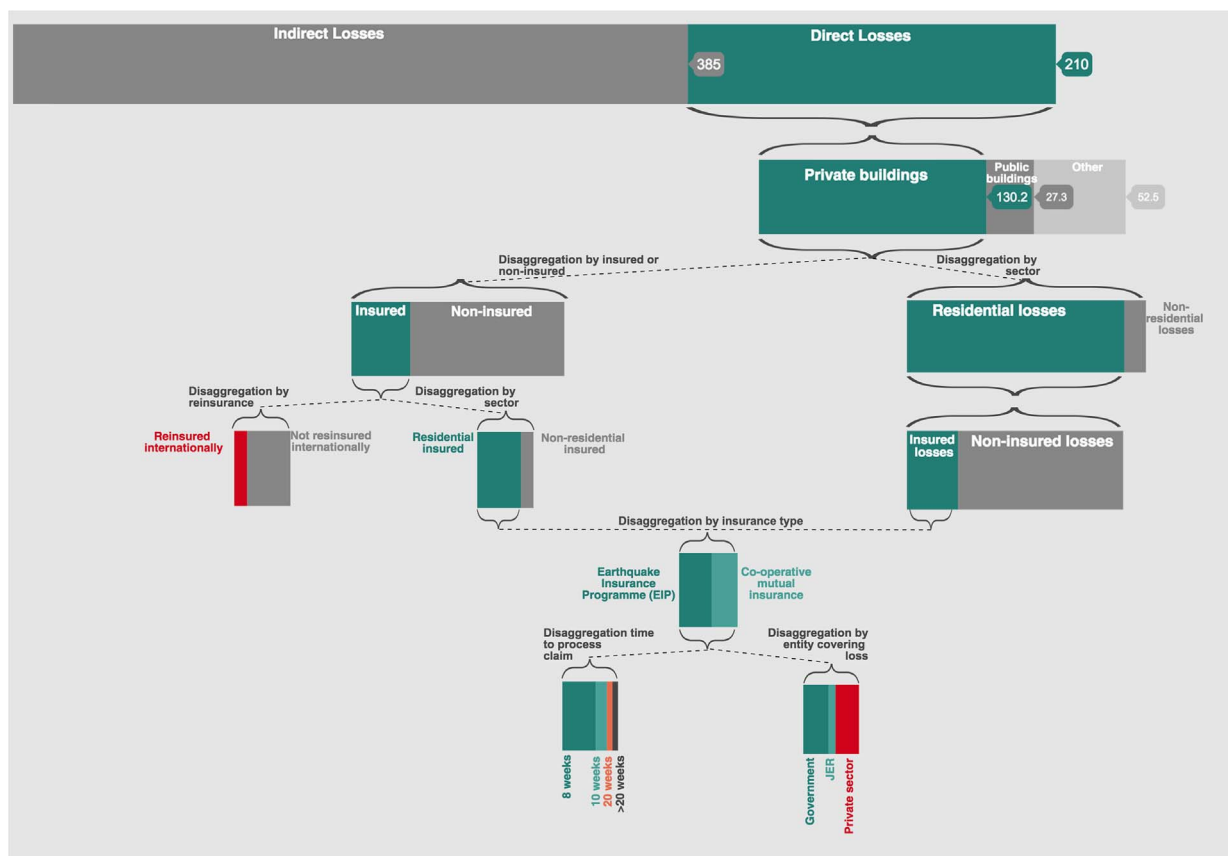


Fig. 6. Breakdown of losses and insurance data (sources provided in the table).

Table 5  
Government of Japan budget allocations.

Activity	Source	Basis of estimate	Amount (USDbn)
Disaster Relief (majority for temporary housing)	[55,54]	Sum of 2011, 2012, and 2013 from GoJ Budget, assuming 80.98 JPY to 1	9.10
Disposal of Disaster Waste	[55,54]	USD	14.93
Public Works related to Reconstruction	[55,54]		55.32
Reconstruction Grants	[55,54]		30.13
Other	[55,54]		171.05

fabricated housing in Japan among higher income groups [41,43] did not necessarily result in acceptability or occupation of pre-fabricated temporary housing. Standard temporary housing with its low cost specification, is, at 30 m<sup>2</sup> much smaller than high end, customised housing units. Site visits among elderly visitors in November 2014 revealed a dissatisfaction with the quality of housing units, particularly regarding a lack of privacy due to no sound-proofing and uncertainty regarding length of stay away from home. Resident interviews suggest that conditions in temporary housing – even as they might deteriorate over time – were more readily accepted once people knew where they were going next.

With regard to local capacity and economic recovery, the Japan Times criticised low levels of local procurement in Iwate (18%), Miyagi (1%) and Fukushima (36%) [10] but the prefectures appear to have taken the view that the numbers and urgency to supply temporary housing required an industrial response. In April 2011, prefectures began to procure beyond their pre-arranged contracts to make up a shortfall of about 7000 units [45]. An international tender was

launched and, although suppliers were asked to consider local materials and jobs, the tender set a minimum supply threshold of 100 units. This excluded all but the largest suppliers and automatically circumvented local contractors and materials [23]. Prior local capacity to deliver pre-fabricated housing was a national level capacity. At municipal level construction firms were small and labour supply was constrained. This gave added an impetus to turn to an established national supply chain and to opt for pre-fabricated housing.

By May 2011, the Ministry of Environment had already set a deadline of March 2014 for the debris clean up, making it a 3 year operation [81]. This meant that rental subsidies had to be extended and temporary housing upgraded beyond the specified two year lifespan [6,87]. Given the regulated context of housing and temporary housing, the end of life options of temporary units [41,43] are unlikely to include squatting or integration into a new core house. Tracking the on-going maintenance, disposal costs and reuse value of the temporary housing units will be an important indicator in the cost-benefit evaluation of the recovery process.

### 3.3. Who pays, who owns and who rents: housing costs and public and private risks

The housing objective was placed alongside the need to ensure employment (livelihoods), the needs of the elderly and the need to both control and subsidise the cost of renting private and public housing [31]. Alongside transitional shelter, the government quickly announced a package of financial measures summarised in Table 2 and Fig. 5. We examine the intended use and costs of the transitional shelter in light of the intentions and costs of concurrent post-disaster interventions.

In line with prior norms, none of the compensation packages were sufficient or intended for the reconstruction or repair of private housing (Table 2 and Fig.5).

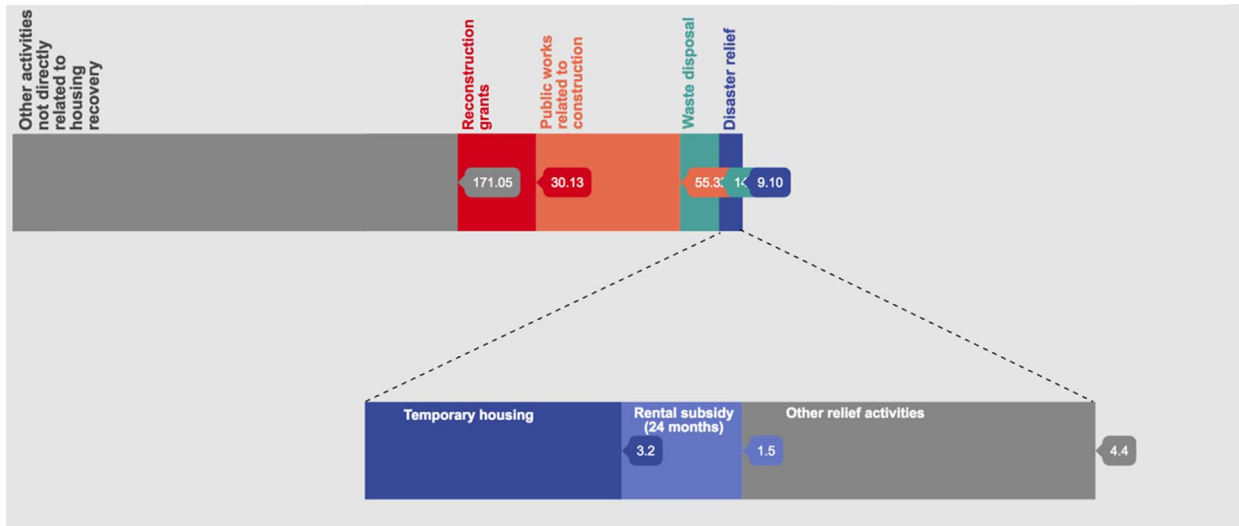


Fig. 7. Summary of Government of Japan budget allocations 2011–2013 to housing related activities compiled and adapted from [20,54,55].

### How might prior housing processes affect different places and households after a disaster?

**Who normally decides when, where and what to build?**

**How is housing normally acquired and who builds it?**

**Who normally pays, who owns, who rents?**

**What values? humanitarian dilemmas**  
what values are is-relevant, given the prior context of 'normal' housing and 'normal' support

**Who? bureaucratic dilemmas**  
who does what, given who finances, owns and rents?

**How? organisational dilemmas**  
how is accommodation support delivered given what is built, how and by whom?

**What? technical dilemmas**  
what might shape shelter trajectories and trade-offs look given who decides when and where to build housing?

Fig. 8. Prior housing processes are specific to a place and are social, spatial, political and historical and shape transitional strategy and personal trajectories after a disaster - actions, expectations and aspirations - are shaped by prior processes and shape strategy.

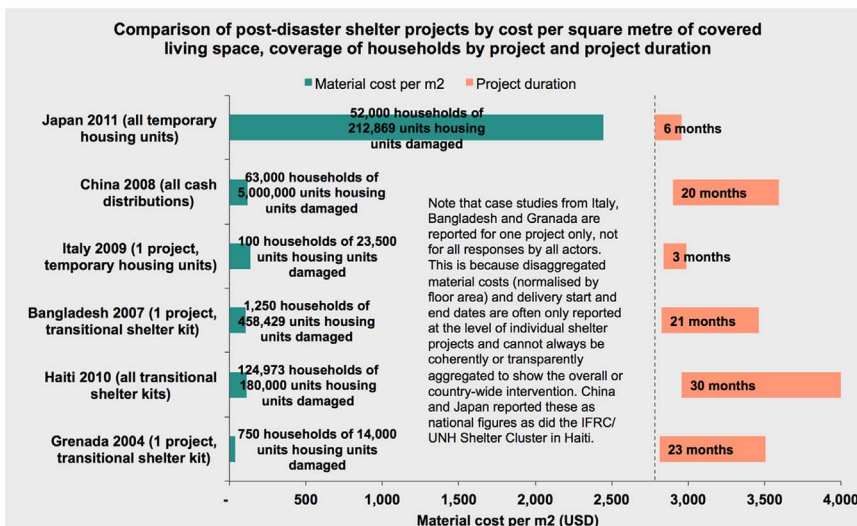


Fig. 9. International comparison of shelter costs and delivery times [1,4,3,2,5,11,22,52,78,82,87].

**Table 6**  
Summary of analysis and implications for other contexts.

How do prior housing and disaster processes affect different households and places after a disaster?	Who builds what?	Who pays, owns, rents?	
<p>Who decides?</p> <ul style="list-style-type: none"> <li>Decision-making in a context of regulation, scrutiny, evidence &amp; public statements.</li> <li>Socio-spatial analysis of previous events had shown how high-level policies played out for different people in different places.</li> <li>Japanese media had reported on the consequences for vulnerable groups stuck for protracted periods in temporary housing on large, remote sites</li> <li>Recent census &amp; housing surveys available in the public domain allowed rental stock to be identified, promoted within days</li> </ul>	<ul style="list-style-type: none"> <li>Land tenure &amp; economic policies shaping building firms - 90% small, local, &lt; 10 houses p.a. - 300 large firms &gt; 100 units p.a.</li> <li>Industrial capacity to deliver pre-fabricated temporary housing rapidly in large numbers</li> <li>Pre-arranged procurement contracts &amp; specifications.</li> </ul>	<ul style="list-style-type: none"> <li>Housing stock (outside cities) dominated by detached houses on family-owned plots.</li> <li>Regulatory framework distinguishes public &amp; private recovery &amp; forbids government support for recovery of private assets</li> <li>Prior norms discouraged hand-outs</li> <li>Temporary houses were defined as a time-limited accommodation service not as an asset</li> <li>Insurance - privately administered, publicly backed - had low penetration in the residential sector</li> </ul>	
<p>Technical dilemma: what shape given prior housing?</p> <ul style="list-style-type: none"> <li>Government recognised trade-offs between safe sites for temporary settlement &amp; the need to connect communities to each other &amp; to livelihoods (promotion of networked relocations) &amp; between promoting self-reliance &amp; the reality that elderly &amp; low-income groups had fewer options &amp; resources (prioritising vulnerable people for temporary housing)</li> <li>Strategy was flexible to accommodate differences in demand between prefectures &amp; household preferences.</li> <li>Private rental was preferred - particularly in urbanizing areas - &amp; prefabricated temporary housing was taken up where there were no alternative shelter options &amp; where temporary sites were available.</li> <li>Temporary houses were not expected to become permanent homes with all the in-situ investment &amp; upgrading or reinstallation in new locations that this might entail in other settings.</li> </ul>	<p>Organisational dilemma: delivery given who &amp; what is built?</p> <ul style="list-style-type: none"> <li>Reasonable for government to assume &amp; for the public to expect temporary housing to arrive within weeks &amp; comply with a pre-agreed specification based on national space standards &amp; evidence on 'normal' housing-specific vulnerabilities [40,50,74]</li> <li>Expected that all but most vulnerable people would meet costs of rebuilding their homes by private means</li> <li>Regardless of means, reconstruction could not start immediately - not a function of time needed to rebuild a house but from the government's prohibition of (&amp; capacity to prohibit) reconstruction to allow time for debris removal &amp; for planning which varied by location. Net outward migration and an aging population before the disaster contributed to a constrained local labour supply after the disaster.</li> </ul>	<p>Humanitarian dilemma: what about the value of cash in context?</p> <ul style="list-style-type: none"> <li>Government expenditure on transitional shelter was 3% of the total recovery budget compared to 5% for waste disposal, 20% for public works &amp; 11% for reconstruction grants.</li> <li>Insurance claims were paid out within 2 months, cushioned recovery for some but were not an instrument for accelerating reconstruction.</li> <li>Reconstruction grants - the only cash that subsidised the recovery of private assets - were available within 6 months but covered only a small percentage of reconstruction costs</li> <li>Households had to have sufficient prior funds or insurance to start rebuilding within 2 years [51].</li> </ul>	
<p>Implications</p>	<p><b>Interpreting lessons:</b> lessons from an urban earthquake in 1995 (Kobe) did not apply wholesale to a coastal tsunami (GEJET) in 2011. Simulations suggest that an earthquake in Tokyo would outstrip Japan's annual capacity to supply pre-fabricated temporary housing &amp; space constraints would make it difficult to install [67]. City-wide preparedness to identify space, rental stock &amp; vacant public or private housing to complement individual preparedness (private insurance, drills, "grab-bags").</p> <p><b>Shed-shaped shelter:</b> transitional shelter took various forms in Japan. Strategic flexibility in light of prior housing, realistic delivery estimates, special attention to those with housing-specific vulnerabilities mattered as much as the value of support.</p>	<p><b>Common understanding of transition:</b> where transitional shelter is not considered a time-limited service, it is questionable whether high value temporary house assets can realistically be distributed equitably.</p> <p><b>Public statements:</b> Japan had clear expectations of receiving support are low or unclear, the cost &amp; speed of temporary housing should be considered against the costs &amp; timeframes of the alternatives that affected people might choose.</p>	<p><b>Equity:</b> unit cost of temporary housing set to control overall expenditure on disaster relief &amp; for parity with other support services (in line with prior norms). Costs not set by making unit costs equivalent to a) cost of building a new house or b) value of 'normal' houses. Such equivalence risks spending more per temporary house because it:</p> <ul style="list-style-type: none"> <li>Reduces overall budget available for debris removal &amp; public infrastructure, shifting expenditure from public to private goods;</li> <li>Reduces total number of temporary units available or eats into support for rental subsidies;</li> <li>Creates inequity because unit cost of temporary housing dwarfs rental subsidies, grants &amp; insurance but need for expensive temporary housing not always related to vulnerability - location is a factor.</li> </ul> <p>(continued on next page)</p>

Table 6 (continued)

Implications

Cash: conditional cash transfers not set by equivalence with amount spent on temporary housing units because:

- Objective to supply time-limited rental accommodation via existing housing stock without causing rent inflation;
- Transfers to individual households do not give collective bargaining power needed to secure temporary sites.

- Rental subsidies may have been above local average rents, but were capped in value and time-limited to control rent inflation.
- Unit costs of temporary housing were controlled through pre-agreed contracts and standards and open tenders.
- Unit costs of temporary housing outstripped rental subsidies per household – even with the 12 month extension.
- Transitional support per household is far less than the average cost of rebuilding a house [62].
- Government reconstruction grants could cover up to 10% of costs for mortgaged properties and 5% for those owned outright and were made available from October 2011 [62].
- Less than a quarter of the population was insured at the time of the GEJET but in Miyagi – the urbanised prefecture – penetration was a third.
- Residential insurance claims covered 47% of losses but approximately 10% of reconstruction costs and insurance penetration was less than a quarter at the time of the GEJET.

A high proportion of overall costs fell to the national government. The emergency budget came from a combination of the GoJ issuing bonds, raising taxes and public sector pay cuts. Private means (including insurance) was expected to cover residential and some commercial property (Table 4 and Fig. 6). The Japan Earthquake Re-insurance Programme (JER) is structured so that, as the loss from an event increases, an increasing proportion is covered by the government; this helps provide stability for companies, but places a disproportionately higher burden on the government for large events. Furthermore, Japan has a lower proportion of insurance transferred to international markets than comparable nations. Companies operating in the Japanese insurance market with foreign ownership account for less than 10% of the market share<sup>10</sup>[38]. An estimated 23% of the Great East Japan Earthquake insured losses were covered by international reinsurance, significantly less than 73% for the 2010 Canterbury New Zealand Earthquake and 95% for the 2010 Maule Chile Earthquake [89]. The reliance on the domestic private market and government-backed insurance policies reduces the inflow from international markets following an event.

Japan's Earthquake Insurance Programme, run by the private sector, offered a swift and simple claims adjustment system [20,38,89] that allowed fast distribution of funds to the insured. A three-step claims adjustment system was adopted that defined damage levels by area (full damage (> 50% of structure value), half damage (20–50% of structure value), and partial damage (3–20% of structure value), leading to 100%, 50% and 5% respectively of the insured's earthquake insurance policy limit being paid. This allowed 60% of claims to be paid within 2 months, 80% within 10 weeks and 90% within 5 months [20,38,89]. This represented 741,000 claims with a value of JPY 1,200bn (47% of total insured residential losses and approximately 20,000USD per claim). As has been seen following previous large events (for example 9.0–11.6% following the Kobe Earthquake), insurance penetration rates increased following the GEJET (23.7% to 26%), with the highest penetration increases seen in the Miyagi (33.6% to 43.5%) and Fukushima (14.6% to 22.2%) [25]. The efficiency of the claims management process and the level of insurance penetration released some private funds for reconstruction. However, due to the need for debris removal and town planning following the event, it was rarely possible to rebuild insured houses immediately or in situ. While insurance may accelerate general recovery by cushioning some households, it does not appear to be intended as an instrument for accelerating reconstruction across the affected population. Even after two years, only households with sufficient prior funds or insurance were able to start rebuilding [51].

What is revealed by a forensic break down of losses and insurance

<sup>10</sup> in the non-life insurance sector. For a more detailed discussion of the insurance market and policy structures see [20] chapter 8.

(Table 5 and Fig. 6), however, is that although the EIP was administered by private insurance companies, the losses were not ultimately covered by the private sector. Rather than transferring risks from households to financial markets, the organisation of insurance meant that a significant burden of insured losses fell to the state via the Earthquake Insurance Programme.

These features of the response can only be analysed in light of the government's intentions and the underlying policy logic. By presenting the relative value of different support (Table 3 and Fig. 5) and shelter support relative to other activities (Table 5 and Fig. 7), we have shown that spending and expectations of compensation align with the principles that temporary houses were not expected to become permanent homes with all the in-situ investment and upgrading or reinstallation in a new location that this might entail. It was also expected that all but the most vulnerable people would meet the costs of rebuilding their homes by private means but that, regardless of means, reconstruction would not start immediately for many households. This delay was not a function of the time needed to rebuild a house: it came from the government's prohibition of (and capacity to prohibit) reconstruction in order to allow time for debris removal and for planning. Delays were a function of location and the specific housing-related vulnerabilities associated with the prior housing context and of localised damage and re-planning processes.

Whether relief and recovery costs are covered by the public sector, private sector or private household resources, the key issue is when these resources will be realistically released, what they mean relative to housing costs and which areas and groups will be left without for longest. It is these factors, rather than the cost of shelter in isolation, that have implications for challenging the assumptions and decisions behind transitional shelter strategies.

#### 4. Synthesis and Implications

We argue for a shift from a context-free set of dilemmas to a contextualised analysis of post-disaster housing. A redrawn framework is shown in Fig. 8.

To illustrate the shift from a context-free view to a contextualised analysis, Fig. 9 combines, for the first time in a single graphic, unit cost, number of units and delivery times in Japan, China, Italy, Bangladesh, Haiti and Grenada. The context-free comparison is that, in Japan, temporary housing was rapid but expensive.

The contextualised comparisons are that:

- norms are missed by comparing these indicators but influence what is possible, what is assumed by the public to be possible, and what is expected of government.
- local variations are missed by comparing overall or project level indicators but are critical to understanding different transitional shelter options and how they interact with vulnerability.
- speed was achieved because there was a pre-existing, industrialised supply chain for pre-fabricated shelter. This should signal scrutiny, for example, of initial projections in Haiti – where no industrialised pre-fabrication existed – to deliver within 12 months [70].
- rental subsidies were a strategic alternative that was available immediately not because renting is more popular or commonplace – the opposite is the case in Japan – but because it was considered early and could be administered. This should signal scrutiny of prior housing processes, housing types and tenures.
- unit costs were high – compared to other subsidies – but these costs were accepted in the context as the most equitable way to quickly provide a 2–3 year accommodation service where no other alternatives were available. This should signal scrutiny of the repeatedly over-optimistic assumptions on pace and cost made after disasters elsewhere [15].

This comparison shows that understanding transitional shelter strategies in light of prior conditions helps to understand shelter projects in other settings and has implications beyond Japan. (Table 6).

#### 5. Conclusions

International Humanitarian Organisations frame their decision-making in terms of context-free dilemmas and this focuses their thinking on unit costs, delivery of family shelters and comparisons of their own projects in different countries. Instead, this paper advocates analysis of strategy in context. Through a case study of the GEJET, we argue for a series of questions that allow transitional shelter strategies to be examined in light of prior housing processes and other post-disaster recovery processes.

We demonstrated the significance of prior housing processes by asking: who decides when and where to build housing; what is built, how and by whom; who finances, owns or rents? This helped to account for patterns of land and housing ownership, geographic differences in housing before the disaster and household choices after the disaster and touched on aspiration and perceptions of permanence. It also explained how the structure of the housing industry affected the pace and size of pre-fabricated housing after the disaster. We further put what was decided and achieved in the context of what was expected and assumed emphasising:

- Recording in decision-making the estimates of relative and the actual pace of multiple activities, rather than shelter delivery speed in isolation.
- Control of overall expenditure on disaster relief in terms of parity with other temporary support and expenditure on public goods such as on debris clearance and infrastructure, rather than the cost of temporary housing units in isolation.
- Japanese pre-fabrication in the context of housing policy, the construction industry, tenure arrangements and attitudes to welfare and public housing, rather than pre-fabricated temporary housing indicators from disasters in other countries.
- Local flexibility (thanks to elasticity in the rental market) of a national strategy that did not get locked in to delivering a single solution, rather than the number of shelter kits delivered in one project in one place.

We found that the government of Japan set a clear policy framework informed by national capacity, regulation and an understanding of housing processes. Decisions about the value of assistance depended on assumptions about how long people might need and expect assistance to last. This was possible due to previous experience (particularly after the Kobe earthquake), publicly available data, and a pre-existing social contract that defined public expectations of the government and various entitlements and timeframes. These were based on public estimates for how long it would take to: allocate rental housing and deliver prefabricated housing; clear debris; reinstate public infrastructures; plan areas for reconstruction; and rebuild private assets.

In Japan, cash alone did not meet and was not intended to meet all shelter needs. Cash transfers were never designed to be sufficient to address the post-disaster shelter crisis. Cash alone could not secure accommodation because not enough housing remained standing to accommodate all those affected and transfers to individual households could not generate the collective bargaining power needed to secure temporary sites for housing. Cash hand-outs were not equivalent to the amount spent on temporary housing units because handing out cash was not a cultural norm and it was intended to supply time-limited rental accommodation via the existing housing stock without causing rent inflation. Cash of equivalent value would have created gross inequities or overspend. Insurance of housing assets cushioned some households but – even with swift claims management – this did not

accelerate reconstruction. Alongside the availability of private means, the construction industry, availability of materials and availability of land and rental housing affect recovery. These factors all impact the quantity, cost and duration of different accommodation options.

We further suggest the notion of targeting vulnerable people (generally assumed by IHOs to be easily identifiable by their old/young age, health status, and gender) is highly complex when housing-related vulnerabilities are properly acknowledged as locally specific, embedded and systemic phenomena. Any response to the massive loss of housing stock has national, prefectural and municipal implications and post-disaster shelter processes – as for prior housing processes – are not just a question of household decisions in isolation. Just as for housing policies generally, it was at the municipal level that the trade-offs played out between finding safe sites for resettlement and isolating people socially or economically; between defining eligibility criteria to target the most vulnerable and stigmatising certain groups; and between the households, regardless of whether they qualified for immediate relief, that were able to access or capitalise on other sources of support or finance and those that could not.

These findings have implications for our peers in the local authorities, universities and technical professional bodies of cities at risk of largescale housing losses. We hope that the questions posed support the first conversations about resource allocation relating to a transitional shelter strategy and other recovery, planning and reconstruction processes. We hope that this, in turn, will support scrutiny of how and by whom post-disaster decisions are made.

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## References

- [1] ADRC, IRP, Great East Japan Earthquake (GLIDE: EQ-2011-000028-JPN) Update on damage and recovery (2nd report) April 6, 2011, 2011.
- [2] J. Ashmore, J. Fowler, J. Kennedy, I. Davis, S. Hirano, S. D'Urzo, Shelter Projects 2010, 2011.
- [3] J. Ashmore, J. Fowler, J. Kennedy, I. Davis, S. Hirano, S. D'Urzo, Shelter Projects 2009, 2010.
- [4] J. Ashmore, J. Fowler, J. Kennedy, L. Esteban, Shelter Projects 2008, 2009.
- [5] J. Ashmore, M. Urquia, S. D'Urzo, J. Ashmore, (Eds.), 2012. Shelter Projects 2011-2012.
- [6] Asia and Japan Watch, Quake victims allowed to stay in temporary housing another year - AJW by The Asahi Shimbun [WWW Document]. AJW Asahi Shimbun. URL <<http://ajw.asahi.com/article/0311disaster/recovery/AJ201302250111>> (accessed 9 June 2013), 2013.
- [7] J. Barlow, P. Childerhouse, D. Gann, S. Hong-Minh, M. Naim, R. Ozaki, Choice and delivery in housebuilding: lessons from Japan for UK housebuilders, *Build. Res. Inf.* 31 (2003) 134–145, <http://dx.doi.org/10.1080/096132103020003>.
- [8] J. Barlow, R. Ozaki, Building mass customised housing through innovation in the production system: lessons from Japan, *Environ. Plan. A* 37 (2005) 9–20.
- [9] F. Bendimerad, The 21 May 2003 Boumerdes Earthquake Lessons Learned and Recommendations, 2004.
- [10] P. Brasor, M. Tsubuku, Disaster housing proves cash cow for general contractors, *Jpn. Yen Living* (2011).
- [11] BRI, NILIM, Technical Note of National Institute for Land and Infrastructure Management: Summary of the Field Survey and Research on The 2011 off the Pacific coast of Tohoku Earthquake (the Great East Japan Earthquake), 2011.
- [12] J. Burnell, D. Sanderson, Whose reality counts?: shelter after disaster, *Environ. Hazards* 10 (2011) 189–192, <http://dx.doi.org/10.1080/17477891.2011.595581>.
- [13] C. Clermont, D. Sanderson, A. Sharmu, H. Spraos, Urban disasters – lessons from Haiti: Study of member agencies' responses to the earthquake in Port au Prince, Haiti, January 2010, Report for the Disasters Emergency Committee (DEC), 2011.
- [14] C.A. Crawford, Can humanitarian responses in urban areas reinforce underlying causes of vulnerability? Tweaking a livelihoods analysis of inequality and infrastructure in splintering cities, *Environ. Hazards* 10 (2011) 327–345, <http://dx.doi.org/10.1080/17477891.2011.597497>.
- [15] K. Crawford, Path-dependency culture in humanitarian decision-making why it was hard to change direction in Haiti. *Humanit. Exch. Mag.*, 2014.
- [16] J. Daniell, A. Vervaeck, Damaging Earthquakes Database 2012 - The Year in Review, 2012.
- [17] I. Davis, *Shelter after Disaster*, OxfordPolytechnic Press, Oxford, 1978.
- [18] DCLG, Table 241: permanent dwellings completed, by tenure, United Kingdom, historical calendar year series. Live tables on house building - Statistical data sets - GOV.UK [WWW Document]. URL <<https://www.gov.uk/government/statistical-data-sets/live-tables-on-house-building>> (accessed 21 November 2013), 2013.
- [19] D.W. Edgington, *Reconstructing Kobe: the Geography of Crisis and Opportunity*, University of British Columbia Press, British Columbia, Canada, 2010.
- [20] EEFFIT, Recovery two years after the 2011 Tohoku earthquake and tsunami: a return mission report by EEFFIT, 2013.
- [21] EEFFIT, The Mw9.0 Tohoku Earthquake and Tsunami of 11th March 2011: A Field Report by EEFFIT, 2011.
- [22] EPYPSA, An Evaluation of the Haiti Earthquake 2010 Meeting Shelter Needs: Issues, Achievements and Constraints, 2011.
- [23] Federation of Housing and Community Centers, Guideline on Acceptance and Listing of Proposals for Emergency Temporary Housing Using Imported Materials, 2011.
- [24] M. Fukushige, N. Ishikawa, Target Standards for floor space in a Government housing plan: an empirical investigation of the Kanto area in Japan, *Int. Real. Estate Rev.* 16 (2013) 208–229.
- [25] General Insurance Association of Japan, General Insurance Association of Japan, 2013.
- [26] GFDRR, Post-Disaster Needs Assessment (PDNA) [WWW Document]. URL <<https://www.gfdr.org/PDNA>>, 2014.
- [27] GFDRR, World Bank Group, UNDP, EU. Developing Disaster Recovery Frameworks World Reconstruction Conference Version, 2014.
- [28] Global Shelter Cluster, Global Shelter Cluster Position Paper Cash & Markets in the Shelter Sector, 2015.
- [29] Global Shelter Cluster, The Global Shelter Cluster: Coordinating Humanitarian Shelter, 2013.
- [30] L. Gordon, Risk and humanitarian cash transfer programming, 2015.
- [31] Government of Japan, Basic Guideline to Recovery from the Great East Japan Earthquake, 2011.
- [32] Habitat International Coalition, Still Waiting: housing rights violations in a land of plenty: The Koko Earthquake and beyond, 1996.
- [33] HERR, (Ed.). Humanitarian Emergency Response Review, 2011.
- [34] Y. Hirayama, The role of home ownership in Japan's aged society, *J. Hous. Built Environ.* 25 (2010) 175–191, <http://dx.doi.org/10.1007/s10901-010-9183-8>.
- [35] Y. Hirayama, Collapse and reconstruction: housing recovery policy in Kobe after the Hanshin Great earthquake, *Hous. Stud.* 15 (2000) 111–128, <http://dx.doi.org/10.1080/02673030082504>.
- [36] Y. Horita, Local Authority housing policy in Japan: is it secure To function As Safety net? *Hous. Financ. Int.* 20 (2006) 34–42.
- [37] IFRC, Coordinating shelter activities [WWW Document]. URL <<http://www.ifrc.org/en/what-we-do/disaster-management/responding/services-for-the-disaster-affected/shelter-and-settlement/coordinating-shelter-activities1/>> (accessed 16 September 2013), 2013.
- [38] IMF, Japan: Insurance Core Principles-Detailed Assessment of Observance, 2012.
- [39] S. Iwashita, Custom made housing in Japan and the growth of the super subcontractor, *Constr. Manag. Econ.* 19 (2001) 295–300, <http://dx.doi.org/10.1080/01446190010020417>.
- [40] Japan Statistics Bureau, Housing and Land Survey, 2008.
- [41] C. Johnson, Strategies for the reuse of temporary housing. Presented at the Urban Trans-Formation Conference, Holcim Forum for Sustainable Construction, Shanghai, China, 2007.
- [42] K. Johnson, Architecture for Humanity: Japan Update: the Post-Tsunami Landscape [WWW Document]. *Archit. Humanity*. URL <<http://architectureforhumanity.org/updates/2011-09-28-japan-update-the-post-tsunami-landscape>> (accessed 21 November 2013), 2011.
- [43] W. Johnson, Lessons from Japan: A comparative study of the market drivers for prefabrication in Japanese and UK private housing development, report submitted as part of the MSc European Property Development and Planning at University College London, 2007.
- [44] M. Kako, S. Ikeda, Volunteer experiences in community housing during the Great Hanshin-Awaji earthquake, Japan, *Nurs. Health Sci.* 11 (2009) 357–359.
- [45] M. Kitamura, Japan's Post-Earthquake Rebuilding Begins With Prefab Housing for Evacuees [WWW Document]. Bloomberg. URL <<http://www.bloomberg.com/news/2011-03-27/japan-s-post-earthquake-rebuilding-begins-with-prefab-housing-for-evacuees.html>> (accessed 16 September 2013), 2011.
- [46] R. Koo, M. Sasaki, Obstacles to Affluence: Thoughts on Japanese Housing, *NRI Pap.* 137, 2008.
- [47] R. Langenbach, Don't Tear It Down! Preserving the Earthquake Resistant Vernacular Architecture of Kashmir. *Oinfoin Media*, 2009.
- [48] R. Langenbach, K.M. Mosalam, S. Akarusu, A. Dusi, Armature crosswalls: a proposed methodology to improve the seismic performance of non-ductile reinforced concrete infill frame structures, 2006.
- [49] M. Lyons, T. Schilderman, D. Sanderson, Harnessing time: Reflections on constraints to development, *Environ. Hazards* 10 (2011) 213–217, <http://dx.doi.org/10.1080/17477891.2011.597498>.
- [50] E. Maly, Y. Shiozaki, Towards a policy that supports people-centre housing recovery-learning from housing reconstruction after the Hanshin-Awaji earthquake in Kobe, *Jpn. Int. J. Disaster Risk Sci.* 3 (2012) 56–65.
- [51] Mayor of Rikuzentakata, Rikuzentakata Mayor office interviews, 2014.
- [52] MHLW, The Damage Situation of and Measures Taken Against the Great East Japan Earthquake —116th Announcement, 2011.
- [53] D. Miller, *Stuff*. Polity Press, Cambridge, 2010.

- [54] MOF, Highlights of the Budget for FY2013 (January 29, 2013), 2013.
- [55] MOF, Highlights of the Budget for FY2012 (December 24, 2011), 2011.
- [56] H. Mori, Land conversion at the urban fringe: a Comparative study of Japan, Britain and the Netherlands, *Urban Stud.* 35 (1998) 1541–1558, <http://dx.doi.org/10.1080/00420989884277>.
- [57] Munich Re, Review of Natural Catastrophes in 2011: Earthquakes Result in Record Loss Year [WWW Document], URL: <http://www.munichre.com/en/media-relations/publications/press-releases/2012/2012-01-04-press-release/index.html> (accessed 5 June 2015), 2012.
- [58] Y. Noguchi, Chapter 1: land prices and house prices in Japan, in: Noguchi, Y., Poterba, J. (eds.), *Housing Markets in the United States and Japan*: National Bureau of Economic Research Conference Report, University of Chicago Press, 1994.
- [59] ODI, Doing cash differently: how cash transfers can transform humanitarian aid: Report of the High Level Panel on Humanitarian Cash Transfers, 2015.
- [60] OECD, Jobs for Youth/Des emplois pour les jeunes: Japan 2009. Summary in English, 2008.
- [61] Office of the Prime Minister of Japan, unknown. Frequently Asked Qs: 3.11 Tsunami Debris [WWW Document]. URL [http://www.kantei.go.jp/jp/singi/kaiyou/hyouryuu/qanda\\_eng.html](http://www.kantei.go.jp/jp/singi/kaiyou/hyouryuu/qanda_eng.html).
- [62] T. Oskia, Town hall, Reconstruction development of Ishinomaki Municipality Office, 2013.
- [63] Oxfam, Transitional Settlement: Displaced Populations, 2005.
- [64] R. Ronald, Between investment, Asset and use consumption: the meanings of Homeownership in Japan, *Hous. Stud.* 23 (2008) 233–251, <http://dx.doi.org/10.1080/02673030801893099>.
- [65] A.L. Sadler, *Japanese Architecture: a Short History*, Periplus editions, Tuttle Publishing, 2009.
- [66] A.V.M. Samson, C.A. Crawford, M.L.P. Hoogland, C.L. Hofman, Resilience in pre-Columbian Caribbean house-building: Dialogue Between archaeology and humanitarian shelter, *Hum. Ecol.* 43 (2015) 323–337, <http://dx.doi.org/10.1007/s10745-015-9741-5>.
- [67] K. Sato, Microsimulation of the temporary housing situation Following an urban disaster: case study of an anticipated Tokyo Metropolitan earthquake, *Soc. Sci. Comput. Rev.* 29 (2011) 103–126, <http://dx.doi.org/10.1177/0894439310370111>.
- [68] T. Schilderman, M. Lyons, Resilient dwellings or resilient people? Towards people-centred reconstruction, *Environ. Hazards* 10 (2011) 218–231, <http://dx.doi.org/10.1080/17477891.2011.598497>.
- [69] Shelter Centre, UN, DfID. Shelter after disaster: strategies for transitional settlement and reconstruction, 2010.
- [70] Shelter Cluster, Draft Shelter Sector Response Plan (as a contribution to a Common Action Plan for Haiti), 2010.
- [71] G. Smith, L. Mohiddin, A review of evidence of humanitarian cash transfer programming in urban areas, 2015.
- [72] A. Sorensen, Conflict, consensus or consent: implications of Japanese land readjustment practice for developing countries, *Habitat Int.* 24 (2000) 51–73, [http://dx.doi.org/10.1016/S0197-3975\(99\)00029-6](http://dx.doi.org/10.1016/S0197-3975(99)00029-6).
- [73] P. Sphere, Humanitarian Charter and Minimum Standards in Disaster Response, 2011.
- [74] Statistics Bureau of Japan, Chapter 21 Housing, in: *Historical Statistics of Japan*. Ministry of International Affairs and Communications, Japan, 1996.
- [75] A. Suppasri, A. Muhari, P. Ranasinghe, E. Mas, F. Imamura, S. Koshimura, Damage and Reconstruction After the 2004 Indian Ocean Tsunami and the 2011 Tohoku Tsunami, in: Y.A. Kontar, V. Santiago-Fandiño, T. Takahashi (Eds.), *Tsunami Events and Lessons Learned*, eds., *Advances in Natural and Technological Hazards Research*. Springer, Netherlands, 2014, pp. 321–334.
- [76] Swiss Re, Natural Catastrophes and Man-made Disasters in 2011: Historic Losses Surface from Record Earthquakes and Floods, 2012.
- [77] Tsunami Evaluation Coalition, Synthesis Report: Expanded Summary Joint evaluation of the international response to the Indian Ocean tsunami, 2007.
- [78] UCLBP, IASC Haiti CCCM Cluster, FACT SHEET – UCLBP & SHELTER AND CCCM CLUSTER HAITI – JANUARY 2013, 2013.
- [79] UN, Shelter after disaster: strategies for transitional settlement and reconstruction, 2010.
- [80] UN, Transitional settlement and reconstruction after natural disasters, 2008.
- [81] UNEP, Managing post-disaster debris: the Japan experience: report of the international expert mission to Japan, 2012.
- [82] UN-HABITAT, Support for post-earthquake housing rehabilitation and reconstruction: progress and issues HAITI, 2012.
- [83] United Nations Department of Economic and Social Affairs, Total Population - Both Sexes in World Population Prospectus, the 2015 Revision, 2015.
- [84] USAID, USAID Fact Sheet #1 FY 2012 Disaster Risk Reduction - Latin America and the Caribbean, 2012.
- [85] Washington Times, Japan slow to build housing for tsunami survivors [WWW Document]. Washington Times. URL <http://www.washingtontimes.com/news/2011/apr/30/japan-slow-to-build-housing-for-tsunami-survivors/> (accessed 9 June 2013), 2011.
- [86] World Bank, Strategic note: cash transfers in humanitarian contexts, 2016.
- [87] World Bank, Transitional Shelter, Knowledge note 4-3, Cluster 4: Recovery Planning, 2012a.
- [88] World Bank, Learning from Megadisasters Knowledge Notes [WWW Document]. URL <http://wbi.worldbank.org/wbi/megadisasters> (accessed 6 September 2013), 2012b.
- [89] World Bank, Earthquake Risk Insurance, Knowledge note 6-2, Cluster 6: The economics of disaster risk, risk management, and risk financing, 2012c.
- [90] World Bank, Commission on Growth and Development, The Growth Report: Strategies for Sustained Growth and Inclusive Development. World Bank, 2008.
- [91] J. Zetter, Challenges for Japanese urban policy: some findings from the OECD review, *Town Plan. Rev.* 57 (1986) 135–140, <http://dx.doi.org/10.2307/40112284>.