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A HUMAN CENTRED APPROACH TO POST DISASTER RESETTLEMENT HOUSING: CASE SUDY ON WALK-UP APARTMENTS IN SRI LANKA

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ABSTRACT

The rapid increase of post-disaster involuntary resettlement presents a significant global challenge. Integral to the disaster management cycle, post-disaster reconstruction is pivotal, serving as the backbone of the entire resettlement process. As post-disaster resettlement is a far more sensitive process than providing shelters, it should address the multidimensional requirements of the resettling community as well as the host community from different perspectives. Despite its criticality, existing research indicate, still there is a distrust about the community satisfaction of post-disaster involuntary resettlement in long-term. In Sri Lanka, recent decades have seen floods, landslides, and tsunamis trigger significant resettlements, highlighting a research void concerning the design aspects of these relocations, which critically influence long-term community contentment. Hence, the study focuses on the identification of design related issues of involuntary resettlements with special reference to post-disaster involuntary resettlement walk-up apartments in Sri Lanka which have an essential and futuristic requirement in the resettlement process. Qualitative approach was used for filling the knowledge gaps about the phenomenon, and development of a descriptive knowledge framework of the phenomenon. Accordingly, this study reinforced by a comprehensive literature review and interviews with beneficiaries to validate the findings of the literature. The beneficiary interviews were conducted by selecting two case studies representing two different types of disasters. The anticipated outcome is the formulation of design indicators to guide policymakers and practitioners towards enhancing the efficacy and community satisfaction in future post-disaster housing projects over the long term.

Keywords: *Human Centred; Case Study; Post-Disaster Involuntary Resettlement; Walk-up Apartments; Sri Lanka.*

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1. INTRODUCTION

The increasing frequency and intensity of natural disasters globally have led to an escalation in disaster-induced population displacements. In Sri Lanka, floods, landslides, and the 2004 tsunami have significantly contributed to internal displacement and necessitated state-led post-disaster resettlement programmes (UN-ISDR, 2009; Correa et. al., 2011).

Disasters have devastating impacts on communities, infrastructure, and the environment. The interpretation of the term 'disaster' varies among different authors and institutions.

The United Nations Office for Disaster Risk Reduction (UNDRR) defines a disaster as a serious disruption of the functioning of a community or a society involving widespread human, material, economic, or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. The Federal Emergency Management Agency (FEMA) (United States) defines a disaster as a sudden event causing significant damage, destruction, and disruption to normal life, resulting in a need for external assistance. Moreover, the International Federation of Red Cross and Red Crescent Societies (IFRC) defines a disaster as an event that causes harm to people, property, and livelihoods, disrupts the normal functioning of a community or society, and results in a need for external assistance. Haigh and Amaratunga (2012) viewed disasters as a social phenomenon that occurs when a community suffers exceptional, non-routine levels of disruption and loss.

As Haigh and Amaratunga (2012) stated, disasters caused considerable damage around the world every year, and the need to respond, recover, rebuild or reinstate the built environment affected by disaster can be identified as a major challenge for the countries affected by disasters. Consequently, the post-disaster resettlement is a crucial aspect of disaster response and recovery. It involves the process of relocating affected individuals, families, or communities from their original homes/locations to safer or more suitable locations after a disaster (Silva & Ballinger, 2021; Iuchi & Mutter, 2020; Tiwari et al., 2023). This process is complex and requires careful planning and design to ensure the long-term sustainability of the new settlements. In this context, architectural design approaches play a vital role in ensuring the sustainability of post-disaster involuntary resettlements.

In the context of post-disaster resettlement housing, various design approaches can be observed globally. Accordingly, one of the key design approaches in post-disaster involuntary resettlements is the use of low-rise, high-density housing typologies. This approach has been widely used in several post-disaster resettlement projects worldwide. This approach allows for the efficient use of land and resources while providing adequate living space for the affected communities. However, the use of low-rise, high-density housing typologies also have several drawbacks in the areas of physical and functional aspects (Pellinan, 2012; Davidson et al., 2007), infrastructure and services (Ozumba et al., 2024), social integration and livelihoods (Archer & Boonyabancha, 2011; Mohit & Raja, 2014; Iuchi & Mutter, 2020), cultural appropriateness and psychological anchoring (Iuchi & Mutter, 2020; Haigh & Amaratunga, 2012) reflecting an alignment between housing provision and the physical, social, cultural, and psychological needs of residents (Lizarralde et al., 2010; Asian Development Bank Report, 2014; Bakar & Osman, 2022; Haigh & Amaratunga, 2012; Ahmed, 2010; Pellinen, 2012). Therefore, it is crucial to incorporate appropriate design strategies to address these challenges and ensure the long-

term sustainability of the resettlement projects. As such this research aims to identify the design related issues in post-disaster involuntary resettlement walk-up apartments in Sri Lanka.

2. LITERATURE REVIEW

2.1 POST-DISASTER RESETTLEMENT HOUSING

Maslow's Hierarchy of Needs is a psychological theory proposed by Abraham Maslow in 1943, in his paper "A Theory of Human Motivation." It suggests that humans have a hierarchy of needs that must be fulfilled in a specific order, starting from the most basic physiological needs and progressing to higher levels of psychological and self-fulfilment needs. The hierarchy is often depicted as a pyramid with five levels, arranged from the bottom to the top.

Accordingly, 'housing' is a basic human need that Maslow explained in the hierarchy of needs as a first important level of need similar to food and drink; therefore, it is at the centre of wellbeing; People must have food to eat, water to drink and a place to call home before they can think about anything else. Furthermore, Maslow's theory also demonstrates how important adequate housing is for security and positive development, and this is the second level of need; people must possess the security of a home and family in order to achieve the higher stage of need "self-actualisation" (Bakar & Osman, 2021).

According to Maslow's theory, individuals progress through these levels sequentially, with higher needs becoming dominant only after lower needs are satisfied. However, it is essential to note that not everyone follows this hierarchy in the same way, where individual experiences and cultural differences can influence how people prioritize and pursue their needs. Additionally, Maslow later proposed a sixth level called "Self-Transcendence," acknowledging that some individuals may prioritize helping others or spiritual growth beyond self-actualization.

In this theoretical sense, shelter is one of the key needs that we need to satisfy in a post-disaster context. The classification of shelters can vary based on different perspectives. In a study by Iuchi & Mutter (2020), post-disaster housing arrangements were categorized into four subsequent stages. These stages were based on the accommodation's purpose, the intended duration of stay for disaster-affected individuals, and whether they would resume their regular household activities in that location. Additionally, provided an explanation of how soon these housing provisions need to be provided.

The categories are 1) Emergency sheltering: Quarters for short periods, for hours or overnight, and to be provided within hours; 2) Temporary sheltering: People's temporary displacement into other quarters, within an expected short stay, and to be provided within a day or two; 3) Temporary housing: Resuming household responsibilities and activities in new quarters, arrangements that exceeded a mere emergency or temporary basis, and extend for months, if not years, to be provided within weeks preferably; and 4) Permanent housing: Returning either to their repaired or rebuilt original homes or moving into new permanent quarters, to be provided within few years.

Irrespective of the type of shelter provided, every shelter has fundamental needs that encompass the key requisites shown in Figure 1. Security and protection from weather can be the priority for those who are relocating to such shelters immediately aftermath of a disaster. However, the priorities of the people change over time when they tend to stay

in such shelters for a longer period. Hence, post-disaster resettlement projects should consider all the key requisites of a shelter into account, not just the immediate priorities of the affected communities.

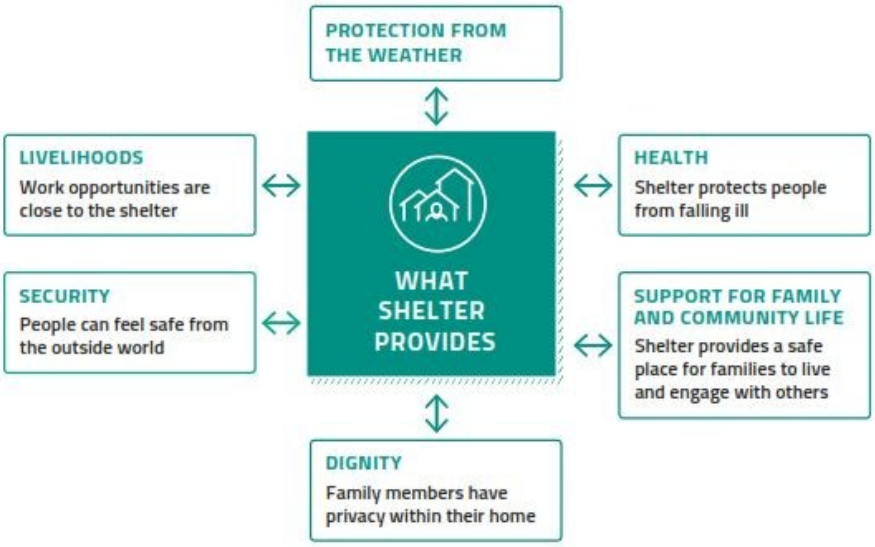

Figure 1: What shelter provides
Source: The Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response, fourth edition, Geneva, Switzerland, 2018. www.spherestandards.org/handbook

The impacts of disasters on the built environment sector and vice versa have been widely discussed in the literature by various scholars in the field (Haigh & Amaratunga, 2012; Paul et al., 2023; Ozumba et al., 2024). As highlighted in the National Involuntary Resettlement Policy (NIRP), the resettlement process should restore the affected community's living standards and integrate them into their new settlements (Godamunne, 2013). Also, it should ensure that the affected people are not negatively impacted. Further, it describes that those people who are living in vertically developed resettlements, have key issues in landlessness, joblessness, homelessness, marginalization, food insecurity, loss of access to common property resources, increased morbidity, mortality, and community disarticulation (Godamunne, 2013).

When considering the current design approaches, single-story individual houses are the most commonly available and community acceptable typology in the involuntary resettlements. However, with the issues of the availability of limited safer lands and other related issues, single-story individual housing is the most critical typology in the present context. Further, as Atmowardoyo (2018) stated, the use of valuable, productive agricultural lands for the reconstruction of new settlements is also a critical factor. Because the economic loss and the degradation of agricultural land could cause some serious problems in the future which could not be exactly estimated from now. Accordingly, the study was mainly focused on the post-disaster involuntary resettlement walk-up apartment housing, which has a futuristic requirement. The following section discusses the issues identified in the post-disaster resettlement housing.

2.2 DESIGN RELATED ISSUES IDENTIFIED IN THE POST-DISASTER RESETTLEMENT HOUSING

The community satisfaction in post-disaster permanent housing provision is determined by various indicators, including physical, social, and economic factors (Pellinan, 2012; Shrestha et al., 2025; Asnudin et al., 2024; Dharmadasa et al., 2024; Xiang et al., 2024; Capell & Ahmed, 2021). The physical indicators relate to the quality of housing infrastructure and amenities, such as the availability of clean water, sanitation facilities, and electricity. Adequate space, ventilation, and lighting are critical factors that contribute to the physical well-being of residents (Shrestha et al., 2023; Montalbano & Santi, 2023; Dias et al., 2016; Mohit, 2014). In addition, accessibility to healthcare facilities, schools, and transportation systems is an important consideration in determining community satisfaction. Social indicators relate to the social fabric of the community, including the quality of relationships among neighbours and with outside agencies, the sense of safety and security, and the degree of social cohesion (Dharmadasa et al., 2024; Hassan et al., 2023; National Academies of Sciences, Engineering, and Medicine, 2015; Mohit, 2014). Community engagement and participation in decision-making processes are important social indicators that contribute to community satisfaction. Economic indicators are critical in determining community satisfaction, including the availability of employment opportunities, access to credit and financial services, and access to markets for the sale of goods and services. The affordability of housing and the cost of living are important economic considerations that contribute to community satisfaction (Islam et al., 2025; World Bank, 2025; Tiwari et al., 2023; Haigh & Amaratunga, 2012).

Based on the information gathered through the literature review, it has been identified that the multifaceted challenges of post-disaster housing resettlement, both globally and Sri Lanka, can be comprehensively analysed through a structured framework comprising three critical phases: planning, implementation, and evaluation. This categorization not only provides analytical clarity but also aligns with contemporary disaster risk reduction frameworks and best practices for resilient and sustainable housing recovery (Davidson et al., 2007). Though the following analysis is presented in three phases, the design related issues are mainly to be addressed during the planning stage as any design-related errors will create impacts during the implementation and evaluation phases.

The planning phase serves as the conceptual foundation for resettlement initiatives. However, this phase is often characterized by significant gaps in site selection, community engagement, and context-sensitive design. Resettlement sites are frequently chosen based on land availability or administrative convenience rather than robust hazard assessments, participatory consultations, or social impact evaluations (Boano & García, 2011; Davidson et al., 2007). As a result, communities are frequently relocated to peripheral or environmentally vulnerable areas, as documented in post-tsunami India and post-earthquake Iran (Bakar & Osman, 2022). Sri Lanka has not been immune to similar challenges, with resettlement sites often developed on marginal lands lacking essential infrastructure and services (Senanayake et al., 2022).

Furthermore, the absence of genuine community participation in the planning process undermines both the suitability and acceptance of housing solutions. Standardized designs; typically produced by external consultants or donor agencies; tend to neglect cultural norms, spatial traditions, and household structures (Dayaratne & Kellett, 2008;

Pellinan, 2012). The exclusion of culturally significant features such as verandahs, internal courtyards, and semi-outdoor kitchens can disrupt daily routines and diminish the adaptability of living spaces (Pellinan, 2012). Compounding this issue is the dominance of technocratic, risk-centric planning paradigms, which prioritize structural resilience while neglecting broader recovery dimensions such as emotional well-being, cultural continuity, and livelihood proximity (Iuchi & Mutter, 2020). This misalignment with community values often leads to dissatisfaction, informal alterations, or even abandonment of provided housing (Pellinan, 2012; Davidson et al., 2007).

The implementation phase, which operationalizes the resettlement plan into physical environments and services, reveals additional deficiencies. Uniform housing templates are commonly deployed with little regard for household diversity or evolving needs. In Sri Lanka, walk-up apartment resettlements have drawn criticism for rigid layouts, poor ventilation, and limited communal space, which collectively restrict residents' capacity for spatial personalization (Pellinan, 2012). Comparable issues have been observed internationally; in Iran, Indonesia, and Haiti; where inflexible housing solutions ignored vernacular knowledge and environmental responsiveness (Bakar & Osman, 2022; Ozumba et al., 2024).

The evaluation phase, which should function as a mechanism for accountability and continuous improvement, is arguably the most underdeveloped. Post-disaster housing programmes tend to focus on quantitative metrics such as unit completion and financial expenditure, while qualitative indicators like user satisfaction, cultural relevance, and psychosocial recovery remain underexplored (Ahmed & McEvoy, 2010; Xiang et al., 2024). This narrow evaluative lens curtails the ability of institutions to adapt practices based on lived experience. In Sri Lanka, evaluations such as those by researchers like Senanayake et al. (2022) have exposed persistent dissatisfaction, particularly in high-density apartment schemes. Common issues include overcrowding, poor ventilation, lack of privacy, and geographic dislocation from employment and services.

Equally problematic is the limited application of evaluation outcomes in future planning and design. Institutional learning is often minimal, and many of the same planning and implementation flaws are repeated across different projects (Davidson et al., 2007; Iuchi & Mutter, 2020). Moreover, most evaluations lack participatory methodologies, excluding the perspectives of the very communities they are intended to serve (Haigh & Amaratunga, 2012). Without integrating community voices, such assessments fail to capture the complex social and cultural dynamics that influence housing success.

In summary, the analysis underscores the multifaceted impact of disaster-induced involuntary resettlement housing emphasizing the need for design professionals to consider the broader implications of their design decisions on community building, resident satisfaction, and the integration of functional spaces. Accordingly, the data highlights a compelling argument for a more resident-centred approach in housing development, one that prioritizes the creation of spaces that support community engagement, personalization, and overall quality of life. Finally, involuntary resettlement can be identified as a transformation of a specific environment in social, cultural, environmental, and economic terms. Hence, the entire resettlement should be a sustainable solution for society.

3. RESEARCH METHODOLOGY

This study adopts a qualitative approach to examine design-related issues surrounding disaster-induced involuntary resettlement housing in both global and local contexts. A comprehensive literature review was conducted to establish a theoretical and contextual foundation, drawing on existing research to identify key design related issues in the disaster-induced involuntary resettlement housing. These findings were validated and contextualized for the involuntary resettlement housing in Sri Lanka. A case study research strategy was adopted for this purpose. A case study is a comprehensive analysis of an individual, a group within an organisation, or a specific event that has distinctive properties (Atmowardoyo, 2018). A multiple holistic case study was conducted to identify the design related issues in post-disaster resettlement housing. 'Post-disaster resettlement housing' was identified as the case study boundary and 'design-related issues' was selected as the unit of analysis. As such, two case studies focused on post-disaster involuntary walk-up apartment resettlement housing projects representing two different types of disasters (landslide and tsunami) in Sri Lanka were selected.

The first case study examined a tsunami-induced resettlement housing project with 100 two-roomed housing units. This case represents coastal displacement and the corresponding resettlement strategies adopted in such contexts. The second case study explored a housing project initiated due to landslide displacement with 75 two-roomed housing units, thereby reflecting a contrasting geographical and environmental context, namely, inland displacement due to terrain instability. In both cases, the occupants have been living in these facilities for almost 10 years, which was intentionally considered to ensure that the satisfaction level of the occupants to be more realistic. Each case study involved the collection of data through semi-structured interviews with twenty (20) beneficiaries from each resettlement project. Accordingly, 40 interviews with respondents from different households in the resettlement apartment, which consisted of houses from different floor levels, were conducted. The interviews were arranged face-to-face with the intention of the researcher to visit these facilities in person to observe the design-related issues persistent in those housing projects. The selection of these two cases enables the study to analyse variations in resettlement outcomes, planning approaches, and community responses across different disaster types. Both cases serve to validate the key design relate issues identified in the literature while contributing practical insights for future resettlement planning and policy development.

4. ANALYSIS AND FINDINGS OF CASE STUDIES

The case studies aim to provide grounded insights into the lived experiences of affected communities and to assess the effectiveness of current resettlement housing in terms of architectural design features. The occupation of the community from Case study 1 consisted of private sector workers and fishermen, whereas Case study 2 consisted of private sector workers and self-employed workers.

Table 1 presented the interview findings in a structured manner based on the cross-case analysis.

Table 1: Contextualised design related issues in case studies

Design related issues	Case study 1	Case study 2
Design deficiencies	Satisfied with internal layout, except the size, building orientation and parking facilities. Inadequate space for home gardening.	Satisfied with internal layout. Inadequate space for recreational facilities, parking facilities and home gardening.
Administrative convenience of site selection for housing	Transportation is not a concern.	Need for safe and accessible transportation infrastructure.
Quality of construction	Not satisfied.	Satisfied.
Quality and accessibility of infrastructure and amenities	Need for enhanced utility services, concerns with the adequacy of water supply, electricity, and waste management systems.	Need for enhanced utility services, concerns with the adequacy of water supply, electricity, and waste management systems. The community desires for internet connectivity.
Economic actives	Inadequate space for income-generating activities.	Inadequate space for income-generating activities.
Absence of genuine community participation in the planning and decision-making process	Lack of community involvement in the planning and construction process.	Lack of community involvement in the planning and construction process.
Exclusion of culturally significant features and misalignment with community values	Satisfied with culturally significant features.	Culturally significant features like worship areas are not included.
Little regard for household diversity or evolving needs	No provision for future extensions.	No provision for future extensions.
Social cohesion due to limited communal space	Comparatively satisfied with the communal space provided in the building design.	Limited communal space to associate with neighbours or recreational activities.
Poor ventilation	Not a concern.	Compared to case study 1, the ventilation is considered poor.
Safety and Security	Dissatisfaction with privacy, safety and security issues.	Dissatisfaction with privacy, safety and security issues.
Sustainability features	Strong interest in incorporating sustainable features such as solar panels.	Strong interest in incorporating sustainable features such as solar panels. Demonstrated collective awareness of renewable energy sources and their benefits.

As per Table 1, the key design-related issues identified in the literature were contextualised and validated through real-life case studies. There has been similarities and differences between the case studies with respect to the identified design related features. Accordingly, Case Study 1 community is comparatively more satisfied with the communal space and culturally significant features provided in the buildings, along with the transportation infrastructure. This was mainly due to the selection of building sites of case study 1 which was at a sub-urban area where the accessibility and spacing were comparatively better than the Case Study 2 which are located in rural areas. However, the level of satisfaction with quality of construction was comparatively low in Case Study 1. Further case study 2, the community emphasized the importance of reliable internet access in today's digital world.

There have been more similarities than differences between the two cases, as observed in Table 1. The issues related to quality and accessibility of infrastructure and amenities, inadequate space for income-generating activities, lack of community involvement in the planning and construction process, lack of provision for evolving needs and safety and security were the key concerns in both case studies. Additionally, the respondents from both cases expressed their strong willingness and support towards sustainable features.

These findings suggest that while certain infrastructural needs are universally relevant across resettlement contexts, and specific concerns influenced by the geographic setting, and socio-cultural dynamics which require site specific responses. Addressing both the shared and unique concerns identified in each case study will be essential for the development of future resettlement projects that are not only functional and safe but also resilient, inclusive, and aligned with the evolving needs of affected communities. Proposing solutions for the design related issues will be the way forward of this ongoing research study.

5. CONCLUSIONS

Housing must not only provide shelter but also support community building, facilitate personalization, and enhance the overall quality of life for residents. Accordingly, a resident-centred approach is essential, which can actively foster social engagement and long-term satisfaction. Further, the involuntary resettlement represents a profound transformation across social, cultural, environmental, and economic dimensions. As such, resettlement efforts must aim to deliver sustainable and holistic solutions that extend beyond physical infrastructure to include cultural continuity and social cohesion.

The study reveals both similarities and differences in terms of design related issues across different resettlement contexts representing different types of disaster, geographical conditions, and socio-cultural backgrounds of the occupants. Accordingly, the issues related to quality and accessibility of infrastructure and amenities, inadequate space for income-generating activities and evolving needs, lack of community involvement in the planning and construction process, and safety and security related issues were highlighted as the key concerns in both case studies. Additionally, certain design related issues were highlighted more by one case study than the other indicating the context-specific findings. Accordingly, the findings emphasize the importance of tailoring resettlement strategies to address both common needs and context-specific concerns. This dual approach is critical for developing resettlement projects that are not only functional and secure but also resilient, inclusive, and adaptive to the evolving needs of displaced communities.

Although recent efforts have increasingly focused on structural resilience, there remains a lack of theoretical and practical frameworks to assist design professionals in creating built environments that address the psychological, cultural, and symbolic dimensions of space which factors that are essential for meaningful recovery and identity reconstruction. Accordingly, this research intended to address this gap by analysing the satisfaction level of the communities that occupied post-disaster resettlement housing.

In providing solutions to the identified design related issues, this research intends to conduct interviews with design professionals in Sri Lanka using qualitative survey strategy as the way forward of this study. Sri Lanka is prone to disasters such as flood, landslide and tsunami. The data collected mainly reflect two types of disasters such as landslide and tsunami. However, as both the landslide and flood are similar in terms of the frequency and intensity of disaster risk in Sri Lanka, the findings obtained can be generalisable within the Sri Lankan context.

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