

# Sustainability and Resilience: Shelter in Emergencies

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## Abstract

Millions of shelters are lost every year due to disasters. During shelter construction and recovery interventions, a number of factors should be considered during planning and designing to ensure sustainability and resilience. This paper makes recommendations for safe and sustainable shelter recovery programming.

**Keywords:** Resilient Shelters, Sustainable Shelter, Sustainable Infrastructure, Shelter in Emergencies

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## 1. Introduction

There has been an increase in frequency and magnitude of disasters across the world. Studies on linkage between disasters and development indicate that disasters can both destroy the development gains as well as throw open opportunities for development (Stephenson & DuFrane 2016)<sup>8</sup>. One of the worst impact of disasters is damage to shelter and therefore there mass construction of shelters by humanitarian actors, government as well as communities themselves. It is important that construction in disaster prone areas whether new or reconstruction should take into account the safety security and gender aspects for sustainability.

## 2. Sustainability and Resilience

Sustainability is the ability of being endured (Merriam-Webster 2016). It is the ability of systems and processes to maintain or defend. USAID defines resilience as the ability of people, households, communities, countries, and systems to mitigate, adapt to, and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitated inclusive growth (USAID 2011). In view of these definitions, it is important to understand what are the key elements of a sustainable and resilient shelter. Through extensive literature review, the following elements have emerged as the determining factors for sustainability and resilience of shelters:

- 1- Program Design
- 2- Technical design
- 3- Material
- 4- Safety and security (including safe failure)

5- Habitability and relevance

6- Flexibility and diversity

7- Significance and long term impact of shelter projects

## 3. Program Design

This is a critical stage. The planning for shelter needs to be based on a detailed shelter assessment with participation from community members and potential owners. Design options should be shared with details of pros and cons. The skill and cost required for maintenance and repair are also key factors that need to be shared with the future owners.

## 4. Technical Design of Shelter

In a sustainability assessment of shelters to identify the best strategy for post disaster construction in terms of using local material versus global materials, it was found that there was no direct association between construction material and sustainability of shelters. The key factor contributing to strength and sustainability of shelter solutions was the use of appropriate design(Escamilla et al. 2014)<sup>4</sup>. One of the major cause of loss of lives during disasters is poor shelter design and the benefits of a good resilient shelter design go beyond economic and social benefits(ISET-International 2013)<sup>6</sup>.

## 5. Material Options for Mass Housing

Mass housing is a critical part of urbanization. It is important to understand the benefits and limitations of the various avail-

able options. Temporary shelters of relief shelters are meant to meet the immediate needs of people displaced due to disasters. One of the issues in community shelters is the need for privacy. During the third NOAH workshop, a group of participants were motivated to develop solutions for partitions using vegetable fibres and a number of designs were created using banana straw (Barbosa 2014)<sup>2</sup>

Monolithic concrete construction systems using plastic or aluminum frameworks help in rapid construction of similar units with minimal involvement of labor and equipment. For economic reasons, it is most suitable for large projects with more than 500 houses. It also requires high capital cost for initiation. Another technology involves use of Polystyrene core panel system. Self extinguishing expanded polystyrene sheet is sandwiched between sheets of welded wire fabric mesh. These panels finished on site are made of different types like single panel for structural uses, internal partition and walls. Double panels are also used. The panel system has high load carrying capacity, and good acoustic behavior. It also provides energy efficiency as well as fire resistivity (BMTPC 2014)<sup>3</sup>.

Air Shelter House technology uses panels made of Thermal Reflective Multilayer System (TRMS) and is useful for making a shelter or emergency tent. It can also be used for creating external or internal thermal skins. The advantage of this technology is that it enables fast assembly of a healthy private that respects human dignity by non skilled workers (Imperadori et al. 2014)<sup>5</sup>.

## 6. Safety and Security of Shelters

A shelter is much more than a structure. It is a place where a person feels safe and secure. It is very important that shelter construction projects whether post disaster recovery projects or a peace time housing for all initiative, should consider the risks of various shocks and build the house for resilience. It should also provide a sense of privacy to the people living inside the shelter. As much as possible, the structural risks should be minimized through appropriate design and material (Sphere Project). Shelter projects very often focus only on the structural safety aspect, but other needs like the need for appropriate spaces for adolescent boys and girls are left un-attended.

## 7. Habitability and Relevance

According to a study by CARE India, ensuring adequate access to safe water must be considered in all shelter programs. Several shelter projects involving relocation still report no occupancy because no thought was given to other necessary services and facilities. Some of the negative impacts of poor shelter planning include deprivation of the communities from facilities

like health, disruption of access to markets directly hitting the income of households and lack of access to clean drinking water nearby. Habitability also depends on availability of land, cost of basic services, law and order and environmental vulnerability. The rapid urbanization in Dhaka has negatively impacted habitability due to high demand for infrastructure and public services with increasing population density (Ahmed 2014)<sup>1</sup>

## 8. Flexibility and Diversity

The shelters constructed should be built with strong foundation and basic structure to provide for possible vertical or horizontal expansions in future. The designs should be customized considering the different cultural and social contexts and needs.

## 9. Discussion and Conclusion

A participatory approach should be the basis of all shelter programming. Community members, technical experts, government officials should together look at all aspects of shelter to propose the most appropriate solution.

Following recommendations were made by a study conducted by CARE India Solutions for Sustainable Development on Post Disaster Shelter in India (CARE 2016)<sup>7</sup>:

- a. Governance should be integrated into all shelter projects as a part of community engagement and participation to promote ownership.
- b. Shelter projects should be seen as a complete ecosystem. Adequate safe water supply should be ensured.
- c. Livelihoods support in combination of shelter programming e.g. providing cash for work post disaster supports the communities in recovering soon. If the livelihood opportunities are very far from shelter sites, it is likely that the people will either sell off their houses or will go deeper into poverty.
- d. Housing, land and property rights of women and girls must be strongly addressed in shelter programs.

Following a disaster, a comprehensive assessment of shelter needs segregated by sex, age and disability should be carried out and the plan should be informed by the findings of such assessments.

Once disaggregated needs have been assessed a range of shelter solutions should be offered to address varying needs. Reconstruction of shelters should consider future risks and efforts should be made to build back safer.

Shelter planning should also consider the carbon footprint of getting construction materials from different locations. Appropriate building materials should be identified.

A plan for capacity building of communities as well as local masons on disaster resilient construction as well as on techniques

for repair and maintenance should also be developed. If possible a maintenance manual should also be developed, explained and handed over to the owners of shelters.

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