Post-Cyclone Sidr Family Shelter Construction in Bangladesh

Documentation of Plans and Processes

Shelter Working Group

Bangladesh 2007-2009

Post-Cyclone Sidr Family Shelter Construction in Bangladesh

Documentation of Plans and Processes

Shelter Working Group
Bangladesh 2007-2009

Scope and Objective

The Shelter Working Group is documenting the experiences of its member agencies on family shelter reconstruction programmes post Cyclone Sidr 2007. This collective experience is expected to work as a resource for future post-disaster family shelter responses. The key informants who contributed to this publication were from the selected Shelter Working Group member agencies. Their programme implementation experiences were compiled through a questionnaire, interviews, formal and informal discussions. Additionally, the author visited four of the most affected districts with support from UNDP, the Shelter Working Group co-ordinating agency. Around a dozen of the different agency-built houses were visited in order to capture the implementation success and the challenges faced on the ground by talking to the agency field staff and the house owners.

This publication is an independent assessment of post cyclone Sidr family shelter programmes by selected shelter working group member agencies. It aims to record what was implemented and to provide a learning platform for future family shelter responses. It captures the experiences of the selected agencies that played a major role in the family shelter recovery and reconstruction process. Although the quantity of houses built is a key selection factor, agencies undertaking any innovative process are also included for documentation and learning.

The focus of this publication is to study the family shelters built within the last two years after cyclone Sidr. These shelters are termed as Core Family Shelters or Transitional Shelters. This research looked into three themes, Disaster Risk Reduction, Structural Soundness and Cultural Acceptance. The overall shelter programme documentation has been divided into the sequence of 'The Process' describing the programme objective, implementation, handover, monitoring and risk reduction strategy; 'The Product' describing the shelter design options, cost, quality, hazard resilience and user's responses. The case histories illustrate both good and bad practices to ensure that future shelter responses are better than what has been done so far.

Author: Rumana Kabir

Edited by: Louisa Grey

Field Investigation Team: Rumana Kabir, Md. Shakil Khan

Graphics Design: Md. Tarikul Islam

Cover Photographs:
Top left: BDRCS/IFRC Safe Shelter Awareness Poster for a Core House owner in Mirzaganj.
Top right: An agency built transitional shelter with latrine in Morelganj.
Bottom left: An agency built core shelter (Source: UNDP).
Bottom right: Transporting shelter and latrine materials by river (Source: ACF).

Photographs by the field investigation team or as credited.

Content

Acknowledgement 4

Foreword 5

Executive Summary 6-8

Chapter 1: Introduction 9-12
- 1.1 Background
- 1.2 Emergency Response
- 1.3 Coordination and Early Recovery Assessment
- 1.4 Cost and Funding
- 1.5 Strategy and Intervention
- 1.6 Response and Reality

Chapter 2: Summary of Findings 13-17
- 2.1 Process and Product
- 2.2 Summary of Findings: Process
- 2.3 Summary of Findings: Product

Chapter 3: Case Histories 18-46
- 3.1 Government's Response: Process
- 3.2 Government's Response: Product
- 3.3 Agency Response: Process
- 3.4 Agency Response: Product

Chapter 4: Conclusion 47-53
- 4.1 Overview
- 4.2 Challenges and Learning
- 4.3 Recommendations

Glossaries and Acronyms 54-56

References 57-58

Annexes: 59-80
- A1: Technical Information Summary
- A2: List of Informants
- A3: Implementing Agency Information Collection Sheet

Acknowledgement

Dhaka, December 2009

Bangladesh was struck by a category 4 cyclone Sidr on 15 November 2007 which created a massive havoc in the communities that it ripped through. Losses in terms of human lives, materials and livelihood were enormous. Housing damages represent the most visible and tangible damages associated with cyclone Sidr. According to Government of Bangladesh sources, the total number of houses damaged stood at over 1.5 million out of which about 37 percent were reported as fully damaged and 63 percent partially damaged.

According to information compiled by the DER-Shelter Working Group (DER-SWG), a number of organizations representing both the Government and the Non-Government sectors stood by the cyclone Sidr victims to help them recover the losses suffered in this sector by way of providing cash grant, distributing emergency shelter kits, undertaking shelter repair works and construction of core family shelters.

The DER-SWG in its meeting held on 29 July 2009, with the Director General, Disaster Management Bureau in the Chair, decided to document the experiences of its member agencies on post-cyclone Sidr 2007 family shelter construction programmes. The aim of this exercise is to record what has been implemented and to provide a learning tool for future family shelter responses. It captures the experiences of selected agencies that played a major role in the family shelter recovery and reconstruction process. Ms. Rumana Kabir, an eminent Architect of international repute and an independent consultant was engaged with support made available by UNDP Bangladesh to conduct the assessment and lead the documentation process. She deserves our sincere thanks and appreciation for preparation of this important documentation.

On behalf of the DER Shelter Working Group, I should like to deeply appreciate and acknowledge the support and cooperation provided by Mr. Md. Farhad Uddin, Director General, Disaster Management Bureau and Dr. Aminul Islam, Assistant Country Director (Disaster Management), UNDP Bangladesh towards preparation of this documentation. Our special thanks are due to all the participating agency focal points who contributed by sharing their experiences. DER Shelter Working Group also acknowledges with thanks the contribution of UNDP's Disaster Response Facility project team members, as well as the field staff of the various participating agencies, who gave their valuable time to the independent consultant during her desk review and field visits.

BMM Mozharul Huq, ndc

Senior Advisor-Disaster Management, Disaster Response Facility, UNDP
and Coordinator, DER Shelter Working Group

Foreword

Dhaka, December 2009

Bangladesh is among the world's most disaster-prone countries and the frequency of natural disasters has increased in recent years. Since independence in 1971, the country has endured almost 200 disaster events – cyclones, storm surges, floods, tornadoes, earthquakes, droughts and other calamities – causing more that 500,000 deaths and leaving serious impacts on quality of life, livelihoods and the economy. Bangladesh is also one of the world's poorest and most densely populated countries, where poverty often compels families to settle in areas that are particularly disaster – prone, such as coastal areas and lands newly emerged from riverbeds (char-lands).

On 15 November 2007, Bangladesh experienced a category four super cyclone (Sidr). The cyclone caused extensive damage to southern part on the country. Cyclone Sidr affected more than 8.9 million people across 30 districts. The total damage was estimated to be around USD 2.3 billion. More than 50 percent of households in all of the six worst affected districts were either damaged or destroyed.

In response to cyclone Sidr, different organizations stood by the affected community at different phases. In the shelter sector, various interventions were supported by the Government and Non-Government agencies towards emergency repair, renovation and reconstruction. Different member agencies of the DER Shelter Working Group undertook these activities for the most vulnerable families, prioritizing women headed households, households with no or very limited income, and households with a person with disability.

With the second anniversary in November 2009 of cyclone Sidr, and with most post-Sidr shelter programmes concluded, the Shelter Working Group has come up with a publication which documents the post-cyclone Sidr family shelter constriction-plans and processes. This publication has captured structural soundness, disaster risk reduction features, environmental sustainability, local acceptance and cultural suitability of family shelters constructed by the major shelter providing agencies.

It is our earnest hope that this documentation will be both a record of the shelter designs and a learning tool for the relevant stakeholders for future use and reference in the matter of family shelter construction in disaster affected areas of Bangladesh.

Md. Farhad Uddin

Director General
Disaster Management Bureau
Ministry of Food and Disaster Management
Chair, DER Shelter Working Group

Executive Summary

Cyclone Sidr, a category four cyclone with a 200-240 kilometres per hour wind speed, hit coastal Bangladesh on the 15th November 2007. This caused extensive damage across 30 southern districts and affected 8.9 million people. It had a death toll of 3,406 with 871 missing and over 55,000 injuries. The total number of damaged and destroyed houses was 1,522,077 of which over 564,967 houses were totally destroyed and 957,110 houses were partially damaged.

Within a week after the cyclone, many development and humanitarian agencies together with the Government established the Shelter Coordination Group or the Shelter Cluster. An Early Recovery Assessment was carried out (within three months) followed by the Early Recovery Action plan, which emphasised the need to build Transitional or Core Family Shelters and to assist in repairing the houses. To date, around 5% of the shelter need has been supported by building Core and Transitional Shelters. The 12 most severely damaged districts out of the 30 affected districts were focussed for shelter interventions and have mostly been covered by various types of shelter intervention. This shelter gap was mainly covered by house repair assistance from the Government and some agencies in the form of the distribution of a cash grant and of shelter kits comprising tools and materials. Almost two years after cyclone Sidr, many of the Shelter Working Group member agencies have completed their shelter programme, some of these are still on the ground continuing their effort and some are raising more funds to carry on more family shelter reconstruction programmes to cover the unmet need.

The Shelter Working Group estimates that out of the 200 listed members; around 30 active member agencies reported their activities and assisted in the relief effort at different phases, with various types of responses such as cash grants and loans, repair, renovation and construction assistance. The families who received houses from the shelter working group member agencies were selected in terms of their vulnerability (women headed households, elderly, disabled, widower etc.) as per the early recovery mandate. The local government played a key role for co-ordinating with the implementing agencies and in allocating designated work areas, whilst the agencies also verified the places themselves. However, there were complaints about the government and few agency assisted shelter providers on the quality of houses or the quantity of materials received and also on discrepancies in the household selection process. Some agencies ensured documentation and monitored the process at each household level to make owners aware of what products or assistance they were receiving and when. But this good practice was rare as the local implementing partner agencies were sometimes over stretched to deliver shelters rather than to mobilise the community to ensure that they know their rights and to participate in their own house building process.

Building houses for those living outside the tidal surge protection embankment and those without a land of their own was a key challenge. Most of the aid agencies avoided responding directly as it involved working through a bureaucratic and legal process. This was considered time consuming within their short-term post-disaster programme funding timeframe and the donor demand. Some of them indirectly facilitated the process by encouraging people to relocate themselves in a safer location inland. Despite the pressure to ‘build back faster’ in the post disaster context, some agencies did manage to ‘build back better’ within the donor driven demand by having a dialogue with and advocating the rights for the most vulnerable landless coastal population. The Government of Bangladesh continued their pre-existing response to provide barrack style, combined row houses for the landless population.

Overall, environmental considerations like green belt and embankment protection or the provision of water sanitation facilities were often ignored in order to provide a durable shelter within the limited budget. However, money and resources were spent by few agencies who often did not consider the tidal surge and flood protection issues for a durable water sanitation solution. Risk reduction initiatives such as advice on planting bigger trees away from houses to avoid house damage or the implementation of safe sanitation practices were considered by very few agencies. The provisions of water for the household or at the community level were not prioritised by many agencies, although some did provide various types of communal water facilities.

A holistic recovery approach with livelihood opportunities, tree plantation, homestead vegetable garden, livestock and poultry raising were considered by very few agencies and only by those who plan to work for a longer term together with some local partners. Homestead level plinth raising through cash-for-work was a common livelihood practice for many agencies prior to shelter construction. Hazard reduction measures in terms of house design, construction practice and supervision, house extension and repair, house hold level training, etc. were implemented for the first time by some agencies whilst the rest followed their previous formulas and standard design practice of delivering shelter as a product from their past disaster response experiences.

The key learning experience from various shelter working group member agencies can be divided into two folds, programme objective and strategy as a 'process' and defining the shelter response as a 'product'.

Process: Programme Strategy
Donor demand often determined the programme strategies for most of the implementing agencies as they were caught in fulfilling the funding criteria. The implementation process was often decided as a top down strategy by the agency providing the fund. Although there is a precedence to work with local partner agencies on ground, it was observed that the valid opinions of some partner agencies or even the implementing agency's field staff were not considered during the planning process. They often felt that they were tasked to implement like private sector contractors, rather than partners or staff who should be able to give feed for programme improvement.

The importance of ensuring contingency planning before the next disaster strikes and to advocate to the donor the need for a hazard resilient shelter response was one of the key lessons learnt for future responses by many agencies. They all agreed that not just a transitional measure or shelter as a relief product should be the solution for shelter response primarily because these programmes still cost the same whether the agency goes for a higher area coverage with no hazard-resilient quality or less coverage with hazard resilient quality.

A shelter programme is more than just delivering a house as a relief product. As many agencies finished their construction project and left, the rest of the community (except those with a core shelter) will still be living with disasters. Therefore, an exit strategy needs to address the issues of how to cover a larger population by improving the community capacity to 'build back better'. As there are often no funds left for continuity or partnership with local agencies or for follow up monitoring, the lessons are not always learnt from the programme.

Product: Disaster Risk Reduction
Core shelters are the preferred solution to cyclone shelters as most people take refuge in a strongly built neighbour's house or stay on their own houses. This is primarily due to protecting the security of personal assets, privacy and distance to travel during cyclone. Most of the coastal families wait until the cyclone starts to see if they need to leave the house before its too late. Therefore 'core shelter' itself needs to have a clearly defined criteria and a standardised way of measuring its hazard resilient quality. The term 'core shelter' has often been miss-used and raised a false sense of security to the house owners. Some field staff also raised the level of house owner confidence regarding a shelter's hazard resilient features. It is not only cyclones but also tidal surge that people should be made aware of. Therefore, disaster preparedness needs to be addressed within the shelter programmes.

During the construction and follow up monitoring process, many structures were left vulnerable as the basic design details did not carefully consider the importance of strong connections and joints of each part of the house. Therefore, the detail design for core or transitional houses should be well conceived and well explained to the implementing contractors and field staff. Agency staff needs to be well trained and made aware of the good and bad points of each design feature and the quality of shelter materials. This will allow them to make the house owners aware of the limitations when their house is described as being 'hazard resistance'. The house owners need to be trained on construction monitoring by producing a construction checklist for quality assurance in future.

After cyclone Sidr the coastal region was struck by two more tropical cyclones in the last two years. This emphasises the need to focus on Disaster Risk Reduction in parallel to the Disaster Preparedness Planning. Further technical assessment needs to be done to ensure that the mass-produced transitional family shelters or core shelters of permanent or semi permanent types are able to withstand category four or a lesser intensity cyclones and to some extent flood and tidal surges. This should be an ongoing learning process and needs to be done together with technical expertise form the government, academic institutes and shelter working group member agencies.

Chapter 1: Introduction

This chapter is a brief overview of the tropical cyclone SIDR response from 2007 to 2009, describing the scale of the disaster, strategy, co-ordination and current state of the intervention.

1.1 Background

Cyclone Sidr, a category four cyclone with a wind speed of 200-240 kilometres per hour hit the southern coast of Bangladesh on the 15th November 2007. This caused extensive damage affecting 30 districts and 8.9 million people. The death toll was 3,406 with 871 missing and over 55,000 injuries. The total damage was estimated to be worth USD 2.3 billion affecting mostly private property and livelihood sources such as crops, along with damaging transport and communication systems, the Sundarban mangrove forest and uprooting 4 million trees. Total number of damaged and destroyed houses was 1,522,077 of which over 564,967 houses were fully destroyed and 957,110 houses were partially destroyed. This was worth over USD 845 million, which is more than half of damage and losses of all sectors. [1]

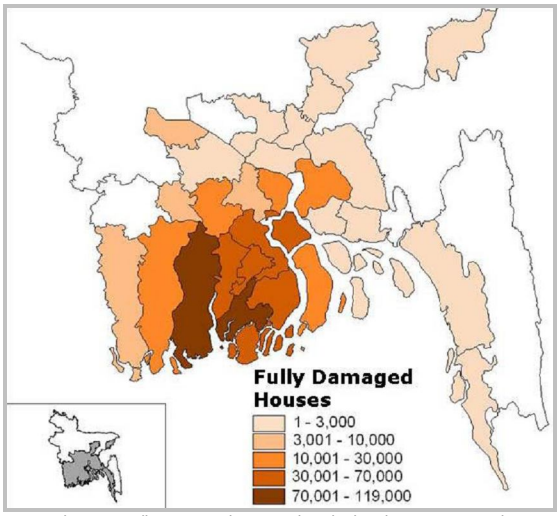


Figure 1: Fully Damaged Houses by Districts (Source: JDNLA)

1.2 Emergency Response

Within the first three months the Government of Bangladesh, international and national development and humanitarian agencies responded to the emergency shelter need for 200,000 families by distributing plastic sheeting, corrugated iron (CI) sheeting and tents with more for 100,000 families. The Government also provided a one-time housing grant of BDT 5000 (USD 70) per family to 100,000 families with fully destroyed homes in the worst affected areas. This was mostly used for emergency food, shelter and livelihood recovery.[2]

[1] i. Super Cyclone Sidr 2007: Impacts and Strategies for Interventions, Ministry of Food and Disaster Management Bangladesh, February 2008, p15.
ii. One year after Cyclone Sidr: fear replaces hope-Oxfam Briefing Note, November 2008, p 2.

[2] i. Early Recovery Action Plan, Ministry of Food and Disaster Management Bangladesh, February 2008, p 8.
ii. Joint Damage, Loss and Needs Assessment (JDLNA) for Recovery and Reconstruction after Cyclone Sidr, Government of Bangladesh, World Bank, European Commission April 2008, p 18.

1.3 Co-ordination and Early Recovery Assessment

The agencies co-ordinated with each other and with the Government through the establishment of six clusters to cover needs of individual sectors. The Shelter Cluster and the Shelter Coordination Group was established within a week after the Cyclone to ensure standards and equitable response, to avoid duplication of relief distribution, to facilitate the family shelter strategy and to highlight the need for the sector. The Early Recovery Needs Assessment was carried out within three months, which led to the family shelter response strategy within the Early Recovery Action plan.

The Early Recovery assessment finding highlighted the following aspects, [3]

a) Out of the 1.5 million affected households, an estimated 66% of affected households with fully damaged houses (equals 316,382 houses) and 83% of affected households with partially damaged houses (equals 698,690 houses) should be able to rebuild their homes without external assistance. Therefore the remaining 507,007 households will need external help.

b) House Types: Around 70% of the damaged houses are *kutcha* houses or huts made of locally available organic materials like timber, tree trunks or poles with CGI sheet or thatch roof and mud plinth. The rest 30% *are semi-pucca* or semi permanent houses with a mixture of brick bordered mud plinth and cement pillars added to the traditional timber post and beam construction.

c) Land Tenure and Site Constraints:
- 80% of the remaining need for the transitional shelter is for families whose previous home was located outside the embankment.
- 31% of households surveyed claimed not to have a title to the land their previous home was built on.

d) Refuge during cyclone:
- 12% of those surveyed reported using official cyclone shelters, despite 80% reporting that they knew that one existed, often less than a kilometre away.
- 37% reported taking shelter in a strong and well-built house in their village while the rest 23% stayed home.

e) Major challenges for rebuilding:

Percentage of households facing various obstacles in rebuilding houses:	**Average of Total 15 Villages**			
	Land Rights/ Land titles (%)	Construction materials (%)	Skilled labour (%)	Time Constraints (%)
	13	**68**	**11.8**	**6**

f) Suggestions by the house owners:
- 90 percent of the households showed positive inclination in reconstructing their houses but wanted to relocate their houses within the embankment (>60 percent) or outside the present village (>36 percent). This decision for shifting was cited as for security from cyclones and tidal surges and river erosion.
- When suggestions were asked from the households for their preferred type of housing construction, majority mentioned strong plinth or foundations as the main criteria.
- When asked about important and immediate need for housing repair 70 percent mentioned CI sheets.
- Majority (58 percent) of households declined from the idea of taking loans for house building or repair.[4]

[3] A. Early Recovery Action Plan, Ministry of Food and Disaster Management Bangladesh, February 2008. P 17,18, 59.
B. Super Cyclone Sidr 2007: Impacts and Strategies for Interventions, Ministry of Food and Disaster Management Bangladesh, February 2008, p 47.
[4] Sidr Report of Field Investigation of Shelter Conditions and Needs: Shelter Coordination Group- Early Recovery Needs Assessment Shelter Cluster, p16.

1.4 Cost and Funding

The government estimated a budget of USD 284 million would be required to reconstruct the damaged houses in 12 highly affected districts. This estimate assumed to reconstruct a fully damaged *kutcha* house (15 x 15 ft) in BDT 20,000 and a partially damaged *kutcha* house (15 x 15 ft) in BDT 10,000, by considering CI sheet roof and wall. Additional technical assistance is required to help vulnerable communities of which 5% of the households are female-headed or with elderly, widower or disabled members. This cost was estimated assuming that more than 98 percent of the houses belonging to the affected people are of *kutcha* (temporary) construction, but for constructing cyclone resistant *semi-pucca* (semi-permanent) house will cost over BDT 100,000, which has not been considered in the overall budget estimate as it is too expensive to cover.[5] On the other hand, the joint assessment by the Government and international experts; damage and losses to the housing sector amounted 845 million. The combined fund allocated so far by the government and international donors to restore housing sector is 126 million, barely a seventh of what was required.[6] Therefore the agencies are still striving to secure funds to carry on reconstruction work two years after the cyclone hit.

1.5 Strategy and Interventions

The shelter recovery strategy emphasised to support the most vulnerable families within the affected communities by targeting the widows, female-headed households, the elderly, the handicapped and the extremely poor. This echoed with the main objectives of the National Housing Policy by 'ensuring housing for all with particular emphasis on the disadvantaged, destitute, the shelter less poor and the low and middle-income group of people'.[7] The strategy also recommended to scale up the pre-existing Bangladesh Bank housing programme to help the lower income group access financial support for building cyclone-resistant houses as well as encouraging other organisations to channel a low or interest-free loan for housing.[8]

Early Recovery Recommendations on Transitional Shelter: [9]

1. Best Practices should be mainstreamed
2. All materials should be durable and reusable
3. Shelter Planning Integrated with WASH
4. Core Shelter Model within Time Limitations
5. Identification of Safe Land for Landless
6. Integration of CBOs and UPs in Monitoring

The Early Recovery Inventions highlighted two different processes:

a) Core Shelter Programming: Building Core Shelters for the estimated 299,182 families still in need of transitional shelter. This progressive approach to shelter provision ensures that it acts as a stepping-stone to strong, cyclone and flood-resistant housing that will reduce households' vulnerability to future storms. It is important also to consider salinity during selection of housing materials, as salinity is one of the persistent risk factors for strong houses in the area. This intervention will generate a lot more livelihood opportunities for jobless people in the Sidr affected areas.

[5] Super Cyclone Sidr 2007: Impacts and Strategies for Interventions, Ministry of Food and Disaster Management Bangladesh, February 2008. p 24,25.
[6] One year after Cyclone Sidr: fear replaces hope-Oxfam Briefing Note November 2008, p 5.
[7] Bangladesh National Housing Policy Salient Feature http://www.nha.gov.bd/index.php
[8] Same as foot note 5, p 16.
[9] Early Recovery Workshop, UNDP, February 2009.

b) Model Shelter Construction: The construction of 'Model Shelters' can be an effective solution when a large portion of the target community is able and is in the process of rebuilding their own shelters. In the construction of the model shelter, skilled and unskilled members of the community that will be involved in the construction of future houses are invited to learn new construction techniques that improve the structural strength and disaster resistance of the houses they construct. This program can be combined with small-scale material assistance or loan programme to provide impetus to spur rebuilding.

1.6 Responses and Reality

The quantity of both transitional and core shelters covered by various agency as of end of 2008 is around 78,519, with some shelter programme yet to be completed. This will cover the shelter need of around 5% of the 1.5 million damaged and destroyed houses (Figure 2). However, the majority of housing reconstruction undertaken so far has been by the affected people themselves and some with cash and material distribution supports from government and agencies.[10] It is estimated that about 1.38m of the affected households (92%) will not receive any official shelter support.[11] Twenty years ago in a similar review, Borton et al (1992) reporting on the 1988 floods, record that the total reconstruction of 15,149 houses after that event amounted to about 0.3% of the 5.1m homes destroyed.[12] So the response rate has improved marginally over 20 years, albeit from a very low base. These figures highlight a need for a national housing strategy and a systematic approach to community repair and assistance to ensure an owner driven recovery strategy to re-build better, faster and safer.

After cyclone Sidr, there was cyclone Reshmi in 2008 with 16,764 damaged houses and Cyclone Aila in 2009 with 600,000 damaged houses[13]. This produced a greater housing need in the coastal areas. This increases the housing loss, which is due to the regular occurrences of flood, river erosion and related housing damages in the country. As it seems next to impossible for agencies and the government to re-build or repair houses for the entire natural disaster affected population who need assistance, it is important to find an innovative approach to combine the shelter programme with disaster preparedness and risk reduction. Although there was an indication in the Early Recovery Intervention of the 'Model Shelter Construction' for the communities, this demonstration process for hands on community training is yet to be explored by implementing agencies and the government.

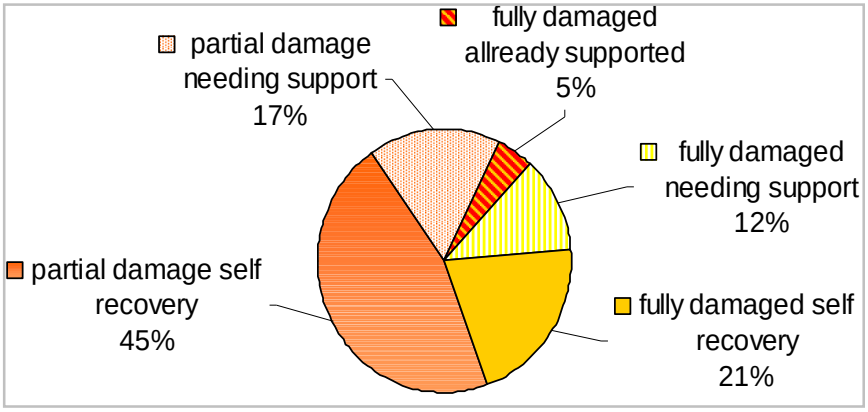


Figure 2: Coverage of Family shelter reconstruction against 1.5million damaged and destroyed houses

[10] Qualitative Assessment of Shelter Construction Situation in SIDR Affected Areas: A Survey Report, Disaster Management Bureau, UNDP 2008. p 58.
[11] One year after Cyclone Sidr: fear replaces hope-Oxfam Briefing Note, November 2008, p 3
[12] Borton et al *in* Disasters and the Small Dwelling, Y. Aysan and I. Davis (eds), James and James Science Publishers Ltd. 1992. p 99,101.
[13] Bangladesh: Cyclone Aila victims still in need http://www.irinnews.org/Report.aspx?ReportId=85141

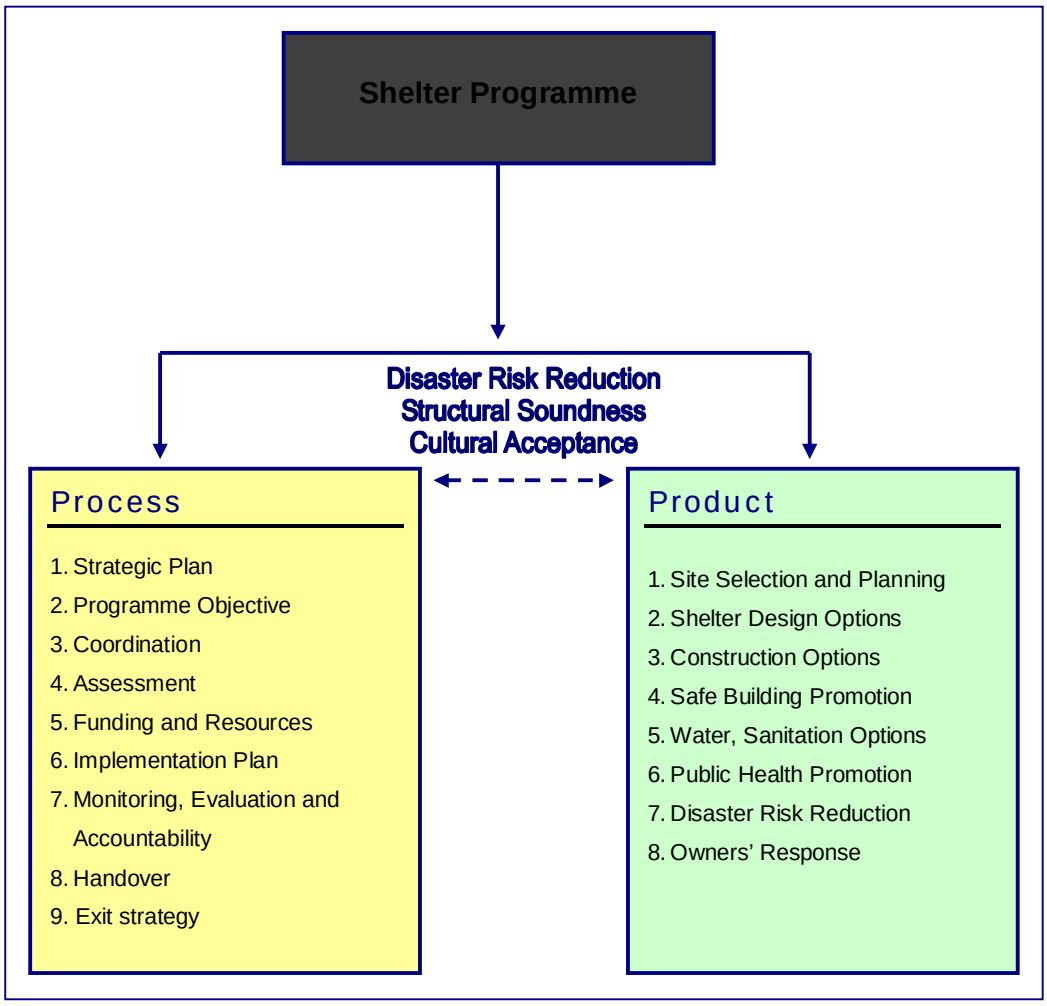
Chapter 2: Summary of Findings

This chapter gives a brief overview of the cyclone SIDR family shelter reconstruction outcome in the last two years. The summary is divided into two sections: Process and Product. The primary information is compiled from various programme documents and questionnaires; field observation and discussion with programme implementers and house owners.

2.1 Process and Product

The shelter programme has been observed in two sequences; 'process' and 'product' in order to have a clear understanding on how the programme has been planned and then implemented. The subheadings under the process and product describe the key challenges and success in the implementation of post disaster shelter programming. These issues are also analysed within three crosscutting criteria,

- Disaster Risk Reduction
- Structural Soundness
- Cultural Acceptance



2.2 Summary of Findings: Process

2.2.1 Strategic Plan

Early Recovery Action Plan indicated two ways to assist the cyclone affected families either by constructing core shelters or by building limited numbers of model houses for communities with a higher level of self-recovery. Most of the agencies went for the core shelter construction option, which was also defined as a 'transitional shelter approach' by some agencies in order to secure funds from donors. During the planning phase, the confusion amongst various terminologies used to define the shelter response actually left many families without any kind of interim shelter assistance. As there was no hard and fast policy set by the Government, the shelter providing agencies as they had in the past, delivered shelter as a relief product subject to amount of funds received from donors, international communities and governments. This covered only a selected number of vulnerable households ignoring the equity of assistance for the rest.

2.2.2 Programme Objective

Where 1.5million houses are damaged, the affected communities are divided as either with or without land and living outside or inside the tidal surge protection embankment. Which communities to help in such a short time and how to involve communities in the recovery process was a major challenge. Donor pressure to build back better and faster also poses a dilemma to the agencies as to which type of response to choose from or how to define their shelter programme amongst the terminologies which were not clear in the early recovery strategy,

- *Shelter for the landless or for those with land* - What are the procedures?
- *Core, transitional, temporary or permanent* - What is the delivery timeframe?
- *Cyclone resistant or cyclone resilient* - What are the technical determinants?

2.2.3 Co-ordination

Field level co-ordination was not frequent due to the distance and time to travel and also the pressure to deliver shelters on time. Therefore most of the agencies informed the local government about their assistance and to identify their area of operation in order to avoid overlapping response with other agencies. National and district level shelter working group co-ordination played a key role in determining the type of shelter response. The issues of shelter provision for the 31% landless was dealt by a sub-working group within the shelter cluster, which slowly faded with time and resource constraint, as many shelter working group members were not able to commit to the issue. Shelter technical working group within the shelter cluster established a minimum standard for core shelter provision, which was then endorsed by the Government's Disaster Management Bureau who was coordinating with agencies. Despite all of these efforts, there was miscommunication at field level because of the lack of regular coordination.

2.2.4 Assessment

Early recovery assessment facilitated on the types of response to choose from followed by technical guidance produced by the shelter coordination group. Agencies did their own assessment with local implementing partner agencies for selection of the areas to work and for verifying the families who will receive shelter assistance. The Government's assessment criteria to provide family shelters to 'the most vulnerable' was conditioned on the basis of those vulnerable households who are able to build on their own land, rather than selecting the most vulnerable landless people. Housing for the landless needed a different strategy, which was initiated by a small number of agencies. This needed the local government's assistance to find suitable land and to legalise the ownership criteria before construction could begin. Despite of all the assessment, some of the agencies were accused of favouring their previously assisted families who were in their existing development project's members.

2.2.5 Funding and Resources

Although in favour for a more durable core shelter option as a preferred recovery strategy, some agencies accepted donor funding to build a less durable transitional shelter. The concept of Core Shelter was new to many donors, who favoured funding multi-purpose cyclone shelter or mega structures even though these were more expensive than family shelter programmes. The agencies were also driven by the urge to provide a durable shelter solution by building core shelters that often ignored the potential to explore the self-recovery process and did not explore a durable solution for those who were in need of repairing houses. Additionally, agencies who invested in staff and logistics support were able to deliver higher quality shelters compared to those who invested least on staffing and to increase the partners capacity building instead in order to save time hired expensive professional contractors.

2.2.6 Implementation Plan

The majority of the agencies response was similar to their past donor driven responses. This was to provide a prototype shelter previously called a "model house" which is now called a transitional shelter by the donors and core shelters by the implementers. Very few agencies invested their effort to tackle the complexities to work for the landless families by working with the government for relocation site selection process, while the rest delivered shelter straight on, sometimes without ensuring linkages to site planning, water sanitation, livelihoods, disaster preparedness planning with community participation at all stages.

2.2.7 Monitoring, Evaluation and Accountability

Few agencies integrated monitoring and construction supervision in their reconstruction plan. They tasked the households to check the quantity of the material they receive is correct and informed them about the tentative time of their programme completion including construction phases. In some cases where external builders or contractors were implementing the construction project, house owners were not aware of the type of construction and materials they will receive. There were fewer complaints from the communities where the agencies had a transparent process of producing public information board regarding the programme timeframe, handover and documentation on the types of assistance and the number of houses built. Very few agencies (except some of the funding bodies) have so far conducted their own internal evaluation exercise to follow up and to improve their response in future.

2.2.8 Handover and Ownership

Most of the agencies produced documents and signboards attached with the house as a record of the house completion and ownership. Some agencies provided every house recipient with a legal document. For some of the house owners who relocated themselves, or who were facilitated by an agency to acquire land, it was important to follow a legal procedure, especially with the government and the landowners. Agencies also went a step further by having a transparent agreement with the community ensuring that the land belongs to the house owner (if documents were lost) and if the house owners were tenants, that the landowner will not evict them. In such cases of the landless tenant, the landowners provided a no objection certificate to build shelter, though in some cases only a seven-year agreement for not evicting the house owner was ensured.[14]

2.2.9 Exit Strategy

Agencies who plan to work further in the effected areas are continuing to work with local partner agencies whilst formulating their exit strategy for the cyclone Sidr recovery programme. The others who were only funded to deliver a shelter programme have either left or handed over cash to complete the houses. Some agencies implemented water sanitation and public health promotion work via local partners to ensure a complete shelter response with a healthy living environment. With few exceptions, most have not yet combined any disaster risk reduction or disaster preparedness measures into their shelter programme to ensure a developmental exit strategy.

[14] Lessons Learnt Workshop on Sidr 2007 Emergency and Early Recovery Response. UNDP, DMB, Khulna 2008. p 10.

2.3 Summary of Findings: Product

2.3.1 Site Selection and Planning

In most of the cases, the shelters were provided in the house owners pre-existing site as the households were selected on condition that they have land of their own. When agencies were facilitating the process by encouraging people to build inside the surge protection embankment, they also let the house owners decide where they wanted to build their houses. The landless people were not targeted unless they could find themselves a plot of land to build on. Therefore, many still remain living in the high-risk area. Short timeframes and bureaucracy challenged the few agencies that worked in land facilitation. Finding of a new plot of land depended on a case-by-case basis and the local government's willingness or the landowners' agreement. Therefore planning of settlements became a complex team exercise, which was deliberately avoided by most shelter responses.

2.3.2 Shelter Design Options

Shelter providers were often unclear of the following issues and therefore produced various types and quality of the houses,

- *Design Objective*
  What is the purpose of the shelter? Is it to be Transitional or Core? How long is it going to last? How to consider Disaster Risk Reduction in terms of House Design?
- *Transitional and permanent design dilemma*
  Some donors put pressure to have a less permanent shelter and cover the immediate need that resulted in a less durable solution.
- *Standards*
  Shelter technical working group established a minimum standard for core shelter provision, which was then endorsed by the Government of Bangladesh. Many agencies found this standard as a useful guide for designing the prototype shelters. Some found these standards were issued too late, as they had started earlier using their previous prototype designs from the past disaster responses. So as not to waste too much time they went ahead with their proposed plans.

2.3.3 Construction Options

The agencies were choosing from contractor built, agency built and community built shelters. Sourcing quality materials in bulk was their biggest challenge. Improving on the local construction practice prevalent in the area was explored by very few agencies. Only few agencies built a widely seen timber frame house, while most of them went for their standard practice from their previous flood or cyclone responses. This is a hybrid construction of RCC posts and timber frame with MS angle truss or timber truss for roofing. Choosing materials like cement pillar and steel truss was perceived as a more durable option and it could be mass produced by many agencies. However, this type of locally available materials was not of high quality and therefore some decided to prefabricate themselves or hired multiple local contractors. Few ensured good monitoring and supervision to achieve good construction quality.

2.3.4 Safe Building Promotion

Like public health promotion, safe building promotion needs to be implemented as a software programme component with the shelter reconstruction to raise awareness of the need to 'build back safer'. Very few agencies realised there was a severe need to strengthen the owner built houses, as most of the rebuilt houses are neither going to be a core house nor cyclone resilient, unless efforts are made. These basic shelters can be improved with small investment in repairing, mobilisation and safe shelter awareness training within the community. While agencies spent majority of their funds to build shelters themselves, these houses will also have their technical limitations of durability and hazard resilient if not maintained in future. Therefore it is important to look at the shelter programme in a holistic way together with the hardware (ie; the house with its surrounding environmental protection) and the software (ie; the demonstration of technical messages by hands-on training and information campaign).

2.3.5 Water and Sanitation Options

Although a house cannot be complete without a latrine and water facility, in many cases this was not prioritised. In some cases the house owners did not have adequate space for a latrine and thus agencies built communal latrines that then faced maintenance issues soon after the agencies left. Making the latrines and water facilities more durable after the disaster has not been given enough attention. Very few made an effort to make latrines more durable in a flood. Agencies who where building houses often did not collaborate with WASH Cluster or with another agency to ensure water sanitation facilities are provided with each house if they cannot do it themselves.

2.3.6 Public Health Promotion

Public health promotion is a well-established programme within many agencies as well as the government. Despite this, only a few agencies are associating their shelter programme with public health promotion activity. Agencies who provided latrine or communal water facilities need to establish a mechanism for maintenance and repair alongside health and hygiene promotion at household level. Agencies who have not provided water sanitation need to re-address this in order to ensure a healthy living environment.

2.3.7 Disaster Risk Reduction

In addition to hazard resilient core shelter design and raising safe shelter awareness, disaster risk reduction should consider environmental protection by incorporating community led forestation programmes, regular tree trimming, cutting bigger trees near the houses to prevent house damage and embankment building or repairing etc. Contingency planning prior to the cyclone season within the agency and together with the local government, stockpiling the shelter repair kits and incorporating the safe shelter awareness training as part of disaster preparedness training can enhance the capacity of the communities to fight the future disasters.

2.3.8 Owner's Response

Agencies working in development programmes have set up good examples of community participation over the past few decades. Facilitating an owner-led reconstruction process whilst relying on the donor driven funds is indeed a challenge. This is especially the case when there is no post disaster reconstruction policy or act to follow. Although houses have a high level of occupancy, their habitability and durability varied from one response to another. Agencies providing continuous support have established better rapport within the community and are learning from their own performance by doing follow-up monitoring and evaluation. However opinions or feedback of the house owners were not prioritised in the beginning of the design process or during the reconstruction time, which was reflected on the owner's responses later. The owners were not always informed by their shelter providers about what type of house, how much is it worth and when they'll receive them. No options about the house design or material selection were given to the community, as the prime focus was to deliver the relief product fast and leave. The agencies also felt from their past post-disaster experiences that people will have mixed opinion on post-disaster relief and have multiple recovery needs which takes time to fulfil.

Chapter 3: Case Histories

This chapter illustrates the government's and agencies shelter interventions. Cases are compiled from the field observations, discussion, desk review and documents provided by the shelter programme implementers. These cases are presented separately as government's response and agency response following the process and product sequence.

3.1 Government's Response: Process

3.1.1 Programme Objective and Strategic Plan

The government of Bangladesh responded during the emergency stage by providing financial assistance of BDT 5000 per family to 100,000 families whose houses were totally destroyed and BDT 1000 per family for partially damaged house repair. In total, the government provided materials like CI sheets and cash grant support for self-recovery to 557,078 families.[15] Furthermore, the pre-existing post disaster response to build barrack style shelters for landless are being implemented by local contractors in eight districts. For those with land, the provision of family shelters (with the Saudi and Indian government funding) is underway. However due to the lack of a coherent national housing policy for disaster response, there were varying agency responses, including the government's response for different target groups.

- *Shelter programme types*[16]

i. Landless Population – Implementation of pre-existing barrack or row-housing construction (Case 1). Some of the 1000 barrack styles housing schemes for 10,000 landless families are funded by Japan.
ii. Those with land
   - Family Shelter reconstruction of 21,200 houses funded by Kingdom of Saudi Arabia
   - Settlement planning to rehabilitate 5 villages was initially planned, which currently came down to building 1600 houses (funded by Government of India and yet in the negotiation stage).

Case 1: Housing scheme for the landless

These schemes are implemented in government owned *Khas* Land, where many landless people have been living for numerous years. In the past, some of the sites selected were located outside the surge protection embankments. Therefore to reduce future risks, site selection priority should be to identify safer locations.



Photo 1: 'Abashon Prokolpo' with income generating opportunity, Jhalokathi 2009 (Source: Taraqual Islam Bhuiya/UNDP).
Photo 2: Government housing for the landless, under construction with communal sanitation facilities, Mirzaganj 2009.
Photo 3: Government's housing outside the embankment got damaged by tidal surge of cyclone Sidr, Patharghata 2007.

---

[15] Family Shelter Repair Reconstruction Updates in 12 Sidr Affected Districts *in* 'Qualitative Assessment of Shelter Construction Situation in SIDR Affected Areas; A Survey Report' , DMB, UNDP, December 2008, p 58.
[16] A. Interview 11th August 2009 - Mr. M.A. Sadeque, Former Co-Chair for all clusters including the Shelter Working Group, Former Director, Disaster Management Bureau, who was involved from the beginning of the cyclone Sidr response.
B. One year after Cyclone Sidr: fear replaces hope, Oxfam Briefing Note November 2008, p 4.

3.1.2 Coordination and Assessment

The local government played a pro-active role in the selection and allocation process of family shelter reconstruction programmes for different agencies. Although the agencies were not focusing on the landless population, in some cases the local government facilitated the process for those who took the initiative. However the families who were selected to receive shelter assistance from the Government of India are still not clear about when and what type of assistance they will be receiving. The Government of Bangladesh provided the lists of 1600 houses to the Government of India and informed the selected candidates in the community the news. Till date, these most deserving families are without a shelter, while the other neighbours who got houses from various other agencies have started living in their new houses. This shows the need for an effective strategic leadership and co-ordination role initially to ensure equitable shelter assistance. This also shows the need for a transparent process within the donor governments who should be part of the shelter working group.

3.1.3 Funding and Resources

The relief and recovery fund of the Government of Bangladesh was channeled through the Chief Advisor's office and the relief cell. The Disaster Management Bureau (under the Ministry of Food and Disaster Management), was tasked to co-ordinate and implement the relief activities for family shelter recovery within the funds allocated. The pre-existing barrack or row house scheme for the landless was funded by the Bangladesh Bank together with other funds from foreign donation, through a separate mechanism. For cyclone Sidr, the Japanese Government has so far has invested funding through the housing scheme for the landless. Most of these projects are contractor built to ensure rapid speed.

3.1.4 Implementation Plan

Out of the 21,200 Saudi funded houses, around 15, 000 houses have been completed (Case 2). The remaining fund of BDT 90,000,000 (nine crore) will be used to build the rest of the houses. The Disaster Management Bureau was involved in the survey process for the houses to be built, while the selection of the villages and house owners was done by the local government. Saudi Government provided the materials to the relief cell of the government of Bangladesh for distribution at the sub district level. Additionally BDT 10,000 per family for transportation, labour and construction cost was allocated for each family.[17]

3.1.5 Monitoring Evaluation and Accountability

The absence of a well-established monitoring mechanism within the government made it difficult to gather information on the progress and the current status of the project. Recipient of the Saudi funded houses were not made aware of the cost of their houses or of the selection and construction process. This resulted in dissatisfaction from the community because they perceive there has been a lack of accountability and transparency within the government's shelter delivery.

[17] Interview 1st August 2009 - Ms. Shaheen Ahmed Chowdhury, Director and Mr. Abdul Mazed, Executive Engineer, Directorate of Relief and Rehabilitation, Disaster Management and Releif Bhaban, Government of Bangladesh.

Case 2: Family shelter funded by the Kingdom of Saudi Arabia

Implementing Partner: Government of Bangladesh
Household selection process: Local Government,
Implementation process: Contractor built,
Water sanitation, livelihood, DRR programme, safe-building promotion and public health promotion: None.

Owners Response:

'In order to get the Saudi Government Funded House, which was first to come in my village, I had to spend 5,000Taka to get my name in the list. If I waited, I could have had a better house built by other agencies, like my neighbours, who waited longer. If I built this house myself, it should not cost more than 40,000 taka. I also had to add extra timber myself, as the materials provided were not enough to make the house strong. Initially I heard that I will get a permanent house with a latrine and kitchen but no one in my village really knows what happened.'

- A Saudi Government Funded House owner

Photo 4: A Saudi Government funded house in Mirzaganj 2009

3.2 Government's Response: Product

3.2.1 Site Selection and Planning

The landless population for many years have occupied the government owned *Khas* land in the remote coastal areas. Some of these *Khas* land selected by the government's housing scheme are often far away from their previous settlements of the disaster-affected population. Lack of livelihood opportunities, education facilities and living in an unfamiliar place results in migration. To tackle this issue, the government housing scheme for the landless ultra poor families initiated livelihood programmes together with the NGOs, in the past. Some of the site selected is still facing challenges as physical infrastructure such as access roads and inadequate surge protection embankments makes the settlements vulnerable to future natural disasters (Case 1).

3.2.2 Shelter Design Options

Initially Government of Bangladesh formed a five-member design committee to produce a prototype shelter design.[18] The Engineering cell of the Directorate of Relief and Rehabilitation (DRR) has designed a cyclone resistant housing model, which costs about BDT 100,000.[19] However, it was not clear if the distributed materials for the Saudi Government funded houses followed the same design (Case 2), or if it was implemented before this design was prepared.

3.2.3 Construction Options and Safe Building Promotion

Bangladesh National Building code is established to guide the construction of engineered or *pucca* buildings, which are predominantly found in urban areas built by the higher income population.[20] In a post natural disaster context, there is no policy or guidelines in place to either monitor or regulate the majority of the country's self-built or traditional rural house construction. This is because the country is overburdened with frequent annual floods along with both cyclone and river erosion. Although the shelter technical working group after cyclone SIDR established some minimum guidelines to build hazard resilient core houses, the government's technical team (who were tasked for designing the family shelters or the barrack shelters for the homeless) were not engaged in the process. The government's House Building Research Institute (HBRI) works independently as a research wing, promoting low-cost housing solution for primarily urban self-builders. However the linkage between implementation and research could suggest in improvement of current rural construction practice and establish better standards.

3.2.4 Water Sanitation and Public Health Promotion

The housing programme for the Saudi Government fund did not provide any water sanitation facilities (Case 2), whereas the pre-existing housing scheme for the landless provided communal water sanitation facilities due to land shortage. As the implementation of shelter and water sanitation schemes are usually completed by outside contractors, there is not yet full consideration given to the need for water sanitation facility or for public health promotion activity to be included as part of the family shelter recovery process.

3.2.5 Disaster Risk Reduction and Owner's Response

The shelter delivery approach allowed very little room for improvement. This is primarily because there has been no follow up mechanism to understand how the houses have performed during the upcoming monsoon, tide or tropical cyclone. The house owners however are improving the houses with their own knowledge and resources (Case 2). In the past, building housing schemes for the most vulnerable landless people in hazardous areas often resulted in wastage of resources and loss of life. This in turn made the people living there more vulnerable (Case 1). Therefore, site specific and owner specific qualitative information should be passed on from the local authority to the relevant authorities, the donors and the strategic decision makers.

[18] Interview 1st August 2009 - Ms. Shaheen Ahmed Chowdhury, Director and Mr. Abdul Mazed, Executive Engineer, Directorate of Relief and Rehabilitation, Disaster Management and Releif Bhaban, Government of Bangladesh.
[19] Super Cyclone Sidr 2007: Impact and Strategies for Intervention, MoFDM, Feb2008, p 25.
[20] Wind Resistance of Non-Engineered Housing, A.M.M.T. Anwar *in* Implementing Hazard-Resistant Housing, R.L.P. Hodgson, S.M. Seraj and J.R.Choudhury (eds), BUET, DFID, Housig and Hazards, December 1996. p 24.

3. 3 Agency Response: Process

3.3.1 Strategic Planning

The relief and recovery plan for the agencies was primarily determined by the amount of funding they already had or were about to receive from the international donors (the donor money being dependent on the scale of disaster). This was followed by the early recovery strategy set by the government. The issue of equity of assistance was lost in the debate of providing a core shelter house (which is usually expensive) versus not providing anything at all to the most of the affected population. Although shelter repair assistance was provided by some agencies, many did not do it as a part of an ongoing shelter strategy. In case of cyclone Sidr, most agencies planned their interventions from the following choices

- *Owner Driven or Donor Driven*
  Most agencies followed the traditional process of donor driven approach from relief to recovery, as they needed to acquire necessary fund for shelter programme. Therefore the prototype design was often prepared as part of a programme proposal to save time and to get donor funding. This did not allow for feedback or options for site-specific adjustments. On the other hand the owner driven repair strategy could be a faster way to cover a broader need by incorporating disaster risk reduction training on shelter awareness.

- *Landless or With Land*
  Very few agencies worked with the government in order to provide shelter for the landless. Many others facilitated the process by encouraging people to relocate themselves in a safer location which was inside the coastal flood /surge protection embankments. A limited number of landless people without any shelter family assistance were benefited by some shelter repair assistance, which was not undertaken as a key shelter intervention by most shelter providing agencies.

Case 3: Shelter For The Landless

i. Legalising Land Ownership

Working on land issues is a long-term process and in contrast to the rapid post disaster shelter need. One agency chose to take this challenge to provide shelter to the landless. They lobbied the government to allocate land for them while other agencies considered this approach not to be feasible. With the help of local partners and local government, this agency managed to obtain land in a relatively short time. They used their existing expertise on land issues and advocated that the emergency situation could be an opportunity to accelerate the land tenure process for the landless. They initiated permanent settlement on the government owned *Khas* land for 140 families, but majority of the houses (107) are yet to be built while the families are living in the temporary shelters.

Photo 5: A Landless woman is receiving *Khas* land ownership documents from land registry Office at Kalapara, Patuakhali. (Source: Action Aid)

ii. Indirect Land Facilitation

Few agencies initiated relocation process for those living outside the embankment by encouraging them to find safer location inland. Due to the extreme difficulty to acquire land or to get government permits to build in public land within a limited timeframe, one programme came out with these solutions:

- After selecting landless families, extra time was given for them to present a land certificate, which is inside the embankments as a compulsory pre-requisite for receiving a house.
- All of them have agreed that living outside the embankment is not safe and sustainable and managed to present the land certificate (rent/ownership/relatives).
- This solution seems to be successful, because 100% of the selected households have presented a land certificate inside the embankments on their own initiative.

3.3.2 Programme Objective

Agencies mainly focused on building houses as soon as possible without defining clearly what type of shelter it should be. This was due to the confusion in using the terminologies set by the donors and by themselves. As a result, there were variances in the cost and the type of assistance (to both permanent and transitional types of shelter) with many claiming to be cyclone resistant or resilient.

- *Core or Transitional, Permanent or Temporary*
  Transitional and permanent design dilemma and debate over the terminology affected many agency responses. Many donors placed emphasis on a less permanent shelter which would cover the immediate need by providing transitional shelters. This affected the quality of the shelters designed as well as the type of response, whether contractor built or community built (Case 4). Core shelter assistance also had its limitations as the most vulnerable landless or tenants were only able to get a permanent or semi-permanent durable shelter only if the land tenure was ensured (Case 5). Otherwise, interim shelter assistance for shelter repair and material distribution was provided by some agencies in the beginning of the early recovery stage.

- *Cyclone Resistant or Cyclone Resilient*
  Core shelter is meant to protect people from future cyclones and perhaps tidal surge if built on a safe location. But there has been no technical agreement to calculate the structural robustness of the various types of agency built houses. Therefore many agency built houses, which were of transitional type, were also claiming to be a cyclone resistant core shelter. Despite this claim, hazards like tidal surge are beyond the structural measures, which were not often highlighted by the agencies in their overall programme planning.

Case 4: Transitional Shelter

Photo 6: Transitional Shelter with latrine in Morelganj 2009.

Structure Type: Timber frame.
Wall: CGI sheet provided by the agency
Windows and doors: Owner Built
Timber Frame: Money provided by the agency to procure timber and to pay the carpenter.
Livelihood Provision: Poultry and livestock
Water sanitation: Toilet provided with each household.
Hazard resilient design feature: None
DRR programme: None
Exit Strategy: The agency plans to work longer in the area as they are raising more funds to repair more schools and building multi purpose cyclone shelters, provide livelihood interventions and disaster prepared activities together with various local partners.

Case 5: Permanent Core Shelter

Photo 7: Core Shelter in Morelganj 2009.

Structure Type: RCC frame structure
Wall: Brick wall until the sill level built by the agency
Window and doors: Owner to built
RCC Frame: Built by the agency-hired contractor.
Livelihood provision: None
Water sanitation: None
Hazard resilient design feature: Permanent RCC structure with tightly fixed CI sheet on steel roof truss.
DRR programme: Currently None
Exit Strategy: 5000TK given to complete the house of which most was spent to procure and to transport brick and cement. In most cases, owners are covering the roof gable and sidewalls leaving fewer openings, as window and doorframes will cost them more.

3.3.3 Co-ordination and Assessment

Initially co-ordination and assessment were done by agencies individually or with local partners to identify the working areas. As co-ordination remained a challenge due to time pressure, logistics and long distance travel within the districts, the opportunity for inter-agency collaboration to provide a shelter as well as an integrated approach with water sanitation, livelihood and DRR training was not explored.

- *Co-ordinated Response*
  Agencies providing shelter lacked in co-ordination of their internal resources and experiences, although the shelter-working group was intended to bridge this gap. The issues of equity, cost and size of shelter (as various types were built) created confusion and jealousy within the community. The agencies also get caught up in their own technical debates to justify their approaches rather than sharing information for future improvements and learning. Despite having minimum technical standards set up by the Shelter Working Group, there was no clear definition on the standards for either a permanent or a transitional shelter response and the timeframe of when to replace the transitional shelter assistance into a permanent core shelter. As the shelter co-ordination group was intended to guide rather than impose any standards or decide on strategy, it was left on agencies to decide their types of responses based on their own judgment with early recovery strategy as guidance.

- *Areas of Work and Targeting*
  The government's early recovery policy prioritised targeting the poor and ultra poor, woman-headed households and families with old and disabled members. The agencies were clear about these criteria and utilised the co-ordination mechanism to target the uncovered villages allocated by the local government. This process helped to avoid duplication of assistance.

3.3.4 Funding and Resources

Agency led post-disaster recovery programmes in Bangladesh have always been a donor driven process. While the house owners themselves build the majority of the houses, most of the agencies (with few exceptions) have limited experience to manage large-scale reconstruction programmes. On the other hand, their long-term development experiences of working within the communities helped some agencies to achieve successful recovery programmes.

- *Funding*
  Although the donors wanted to ensure the early recovery need was met by providing transitional shelter repair and reconstruction assistance, few of them supported a durable core shelter as well as permanent housing programme. This resulted in a variety of shelter responses, with different programme timeframes and shelter quality.

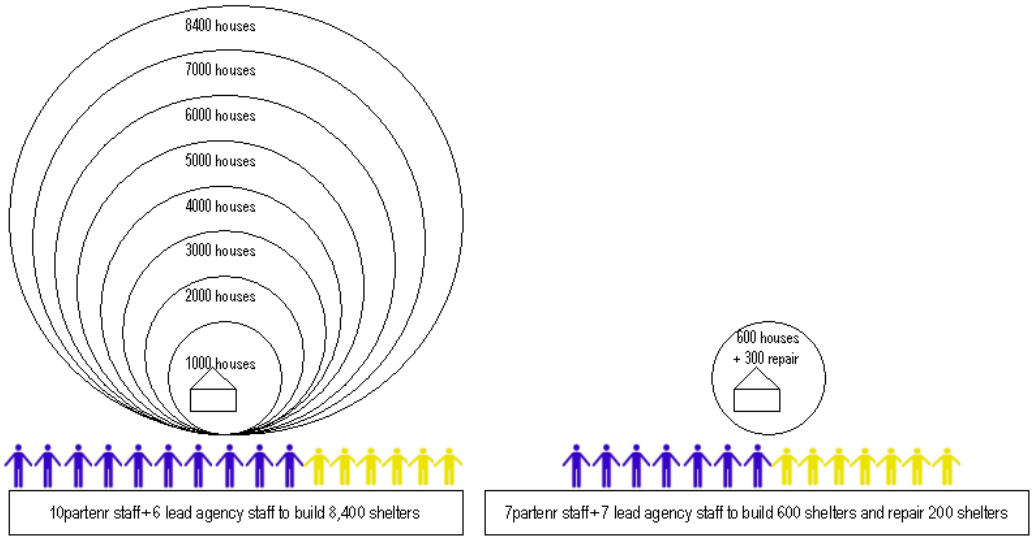
- *Skills and Expertise*
  Shelter providing agencies had a combination of local partners and international expertise consisting of newcomers to the country and experienced teams who had delivered post disaster shelters in a past. The newcomers took on board recommendations from the experiences of previous shelter provision and their response was to building slower with less emphasis on quantity and more on quality. Some of the experienced teams often used their previously built family shelter designs and started faster to cover a larger quantity.

- *Staffing and Partnering*
  Staff are usually overstretched at the field level to tackle the pressure of rapid implementation both from community and donor side. Construction programmes covering a large number of areas are very often supervised by a smaller number of staff. As a result, construction supervision or quality control was the contractor's responsibility and the monitoring was an occasional effort by agency staff. As often happens in post-disaster reconstruction, in order to attempt to be cost effective, small numbers of staff are

delegated with a huge number of tasks to complete in a short timeframe. They are often prone to corruption or failing to be transparent, thus unable to have a good relationship within the community and therefore lose the donor funding.

Case 6: Partnering or Sub-contracting?

Agencies who invested more on staffing, as well as teaming up with partner agencies, performed better in terms of community mobilisation and monitoring, as well as capacity building for future. The agencies performing better allowed their partner agency staff to utilise their community mobilisation capacity rather than engaging them in an unfamiliar construction management situation.



In one case, the same local partner agency delivered two different types of shelter delivery, with two different lead agencies who were funded by the same donor. In one response, the agency had 14 staff, of which 7 were from partner agency for social mobilisation to build 615 core houses and to repair 300 houses, which improvised local timber construction practice of timber frame house. In another case, contractor built shelter programme to provide houses with cement pillars with timber members as transitional shelters to 9400 families. These same partners provided a very low quality shelter with no transparency within the community. Their size of house changed three times to accommodate more quantities. This programme only had 5 staff from the lead agency and 10 partner staff, who were responsible for overall programme management while the lead agency provided indirect support to the programme.

3.3.5 Implementation Plan

The agencies who spent longer in planning had a better implementation system in place. The majority of the households selected were not involved in the house design process or in determining the house size and choosing the materials. The prototype shelter design was predetermined in order to produce a proposal for the re-building programme and to raise the funds for the programme implementation, as well as to avoid delay in procurement, tendering and contractor selection process. Sphere international standard were literally taken for the house size and space ratio per person only and not for planning or shelter programme implementation standards.

- *Shelter Design:*
  Agencies spent from a minimum of fifteen days to a maximum of three months for the shelter design process. Few agencies' design was based after community assessment although many of the final designs were not shared with the households or to the local

builders for feedback. This could have saved money and resources as some of the evaluation exercise reveals on the comments of the house owners on what works well and what doesn't. From their past post-disaster experiences, some agencies considered that giving choice and consulting is not always necessary '*as the people will say yes to receive anything as a free relief or ask for more*'. But it was clearly evident from their evaluation documents that it could have saved the extra resources if a participatory design process was adopted during the shelter design development phase. Shelter working group recommended core shelter concept and standards were useful during the transitional and early recovery phase, but were too late for many who already completed their design for approval from donors and were in the procurement stage. Due to land shortage within the households, agencies were challenged to provide adequate sized shelters with individual latrines for each and every household. Very few agencies who built permanent shelters at a later stage, spent more time to develop concept both from owners to donors end on their own initiative.

- *Structural Soundness of the Design*
  Some of the new shelter designs considered few hazard resilient options while the older shelter providing agencies relied on their previously designed prototypes, which was produced by the agency technical team or external consultants. Agencies who invested extra time and resources did further research on their past experiences and took previous good practice learning into consideration. Although many of them claim their designs to be technically sound in terms of hazard resilience or even cyclone resistant, majority did no structural calculations in order to determine the performances of houses during different categories of hazards. Some agencies redesigned and built additional houses based on their newly acquired fund, almost near the end of two years after the cyclone. Although it is rare, one agency did do technical testing in order to make sure that the design and structure is able to withstand for Category 4 surge and wind. The structural stability of this design was confirmed by simulation test for Category 5 cyclone in the region.

- *Livelihoods and Social Integration:*
  Shelter repair programme did engage the local construction sector and created opportunities for local people. Many agencies involved households in plinth preparation either as cash for work scheme or through community mobilisation as well as for building their wooden frame structure. Many external contractors also employed both affected and non-affected labour forces in addition to their own external team. Although the re-construction activities generated direct and indirect job opportunity for the local construction sector, a large amount of money was going to the non-cyclone affected population and to the bigger contractors and suppliers who were mostly from the non-affected areas of the country.

Case 7: Livelihood Recovery

Many agencies worked at the initial stage of early recovery by assisting in shelter repairing. The households were involved in preparing their plinths under cash for work activity while the toolkits were underway for distribution amongst the local crew, as a shelter repair programme. Although this was an effective way for recovery, many house owners did not have enough salvaged materials to build their houses with. Most of them did not receive any further core shelter assistance for not having their own land.

Photo 8: Plinth Raising as Cash For Work,
Photo 9: Tools Distribution to the affected carpenters, Patharghata, Barguna 2007

- *Environmental sustainability and disaster risk reduction*
  After the severe damage to the mangrove forests in Sundarban, the government imposed rules for its protection. In order to prevent further damage and deforestation, restrictions were imposed on using the locally available resources such as timber as well as halting other forest based livelihood activities. This encouraged the use of building materials like brick and cement, which was outsourced, or perhaps using a larger quantity of local fuel for its production. The salinity affect for using poor quality reinforcement in the cement pillar is already evident in the past shelter reconstruction. As construction works produces Carbon footprint, measure such as planting bamboo, which absorbs lot more Carbon di Oxide than any other plants could be incorporated. Reversing technology has not been used and therefore disaster risk reduction needs to address a sustainable reconstruction along with durable shelter solution. It should continue as an ongoing process within the recovery effort for environmental preparedness, such as tree plantation, establishment of community nurseries, embankment building, repair and protection.

Case 8: Impact of Cyclone Aila 2009

Photos10, 11: Barguna 2009 (Source: ACF)

Part of embankment is washed away, damaging a newly built core shelter mud plinth. The timber frame house was connected with short cement stumps, which prevented it from tipping.

- *Construction Management*
  There were primarily three types of construction process: agency managed, community managed and contractor managed. Many agencies that chose contractor built shelter programme found the process of procurement and tendering to be a challenging part of their programme. Agencies choosing a community driven transitional shelter reconstruction process were able to deliver faster in terms of procurement and construction management as the major responsibility was taken by the house-owner who could access materials from local market and build using the local carpenters. However there was not enough technical supervision available, which could have benefited the quality of construction. The construction supervision process varied from agency to agency, depending of the number of staff or contractors engaged and determining the house owner's and partner agency's role to do so.

3.3.6 Monitoring, Evaluation and Accountability

Sphere Common Standards indicates the need for monitoring and accountability to ensure an effective impartial programme[21]. Agencies working in the post cyclone Sidr response often faced problems due to lack of communication and regular monitoring.

- *Monitoring*
  The documentation process helped house owners to be aware of the cost and quantity of the materials they are about to receive. Construction monitoring checklist at various stages of the construction process ensured a transparent process. This was only seen in the owner managed reconstruction process as the majority of contractor managed shelters were monitored by external supervisors. Because of this agency staff were accused of corruption for not following a transparent process of monitoring and informing the community.

Case 9: Technical Monitoring

Some agencies experienced with managing construction projects established systems to monitor the construction process. For example, an agency ensured good construction monitoring of their contractor led reconstruction process by engaging the following field staff with technical experiences,

- One Shelter Monitoring Officer monitors average of 20 houses within the same area.
- One Infrastructure Officer monitors the technical aspect of the construction and ensures that Shelter Monitor Officers have adequate knowledge regarding housing construction specifications.
- One Shelter Project Manager oversees the project implementation including all technical aspects.
- One Program Coordinator monitor ensures overall coordination including reporting.

The Head Office provided technical support to this team as required. As this agency had a good staff mechanism in place they also ensured the quality of their materials by doing a follow-up up monitoring after the houses were built. In one incident, although a well-reputed supplier delivered them with high quality CGI sheet for roof, it was found that some of the sheets already started to rust. This was reported from the filed and the agency took immediate initiative to negotiate with the suppliers to replace all these CGI sheets. This successful case shows a process of good quality assurance. The agency learnt to hold the suppliers accountable and to produce a pre-agreement with the suppliers - a clause for replacement options if any problem arising in material quality.

- *Evaluation*
  The international donors or funding agencies were involved in post construction evaluation but very few agencies conducted their own internal evaluation exercise to follow up and to improve their responses. Donor accountability to provide hazard resilient shelter and to

[21] The Sphere Project: Humanitarian Charter and Minimum Standards in Disaster Response 2004.
Common standard 5: monitoring -The effectiveness of the programme in responding to problems is identified and changes in the broader context are continually monitored, with a view to improving the programme, or to phasing it out as required.
Common standard 6: evaluation - There is a systematic and impartial examination of humanitarian action, intended to draw lessons to improve practice and policy and to enhance accountability.

ensure the 'build back better' strategy often were not implemented on the ground as many agencies were prioritising building faster to meet the donor budget deadline. Some agencies pointed that donors were more interested in project completion on time. Very few donors were engaged in technical monitoring and none had enough technically sound experts, which resulted in a difficulty to argue the case of durability versus transitional measures.

Case 10: Accountability

When agencies followed a transparent process of producing public information boards regarding the programme timeframe, handover and documentation on the types of assistance the house owner was receiving, there were less complains about corruption and discrepancies about assistance.

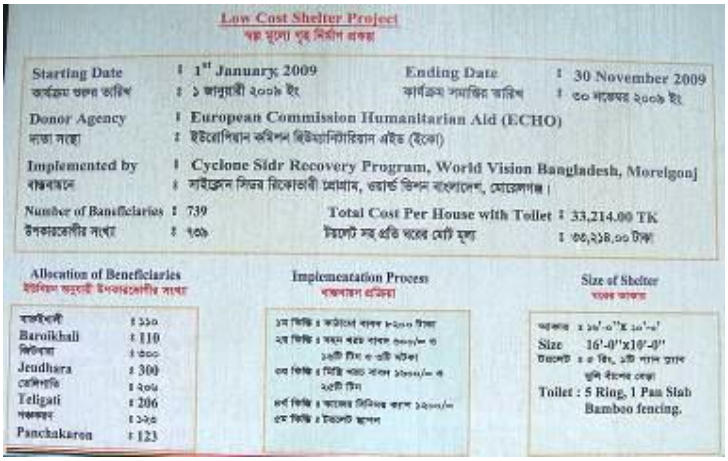


Photo 12: Information board in Morelganj, 2009 (Source: World Vision)

3.3.7 Handover and Ownership

Handover and documentation process ensures transparency and legal rights to shelter for the house owners. The land ownership was also ensured prior to the provision of shelter by most of the agencies directly or indirectly. The ownership documentation process although limited to the core house recipients was a remarkable achievement.

Case 11: Handover

One agency produced a handover document with signature for house-owner, local leader, district authority and agency staff. They also produced legal documents with the details of materials and size of the house mentioned in it as well as the owners photograph. A copy is kept with the house-owner and one with the agency. This process ensures a transparent practice and gives clarity to the house-owners about the type of housing assistance they have received.

Photo13: Legal documents for core shelter handover (Source: BDRCS/IFRC)

3.3.8 Exit Strategy

In order to ensure that the houses will be used and maintained, it is important to involve the owners at all stages. Although many agencies worked with local partners, their way of working was often not consultative. It is also important to have a follow up and monitoring process within the exit strategy to see if things can be done better the next time. Some agencies are still formulating their exit strategy with few linking it with disaster preparedness training while most of them has left.

- *Owner's Response, Cultural Acceptance and Occupancy*
  The house owners who were privileged to receive shelter assistance need to be given the opportunity to voice their opinion on how to improve the performance of the agency response. Usually 'build and leave' strategy by agencies does not help them to learn for the future response. Therefore, it is important to get owners' feedback at all stages including the exit stage, even if there is no plan or resources left to continue work in the area.

- *Follow up and monitoring*
  Any post disaster reconstruction programme needs to have a follow-up and monitoring strategy in order to see if the shelters have evolved into a home, or if people migrated, sold the house or got evicted in a worse case scenario. Follow-up needs to look at the hazard resilient performance, what worked well and what didn't. For example, many agencies built core shelters that were strong enough to withstand mid range cyclone and people were confidant to stay in them. But some still took refuge in the cyclone shelters or other safer locations during cyclone Aila in May 2009. Therefore it is important to ensure information on disaster preparedness and awareness on early warning measures; as well as making sure that house owners know that the core houses they received can give them a limited amount of safety but cannot guaranty tidal surge protection in many locations.

Case 12: A Permanent Core House

One agency built 172 permanent core houses in three months. Although they could not complete these houses nor provide water sanitation facilities, the important feature of these houses is that they are permanent structures with reinforced concrete columns and brick infill. The houses visited in Poshchim Shorailia where initially the agency planned to build 45 houses showed that 75 houses had been built, almost double than originally planned.

Photo 14: Tarpaulin used to store rainwater Photo 15: House owner bought bricks to fill up the core-house walls.

Owners' Response:

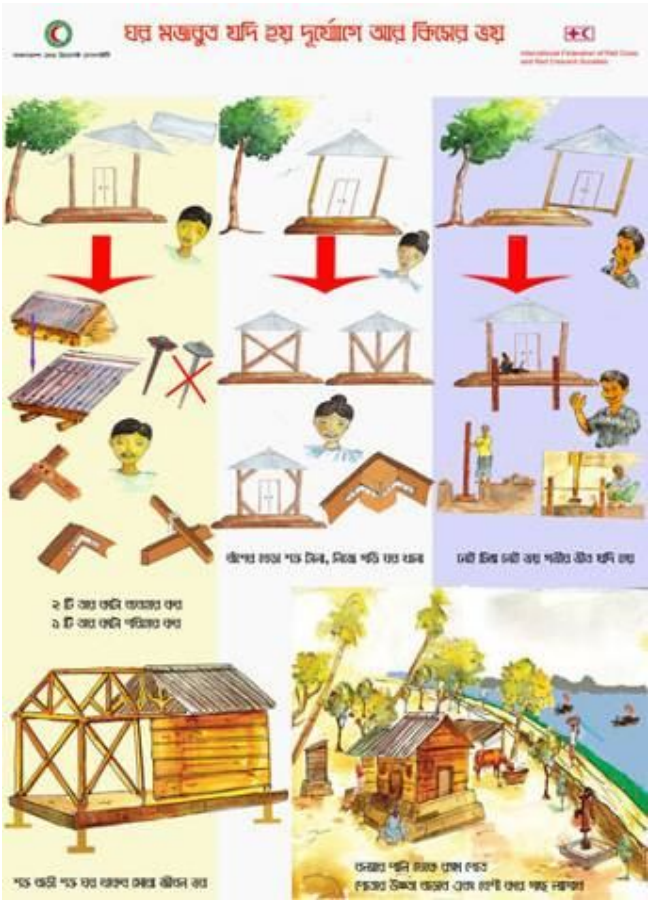
'It took us a year after the cyclone to receive a permanent one-room house of 8hatX10hat (12ftX15ft) size. Before that we received a tarpaulin sheet within 3 to 4 months after the cyclone. In our village 45 households were initially listed, but it jumped to 75 households later. Maybe that's why the agency didn't mange to finish any of these houses. After we were listed as a house recipient, we were asked by the agency to prepare the soil for the house plinth according to their planned house size. As we were aware that salty water should not be used for house construction, we provided the pond water to the construction workers, by carrying them ourselves.
During cyclone Sidr, the surge water came up to 3ft from the ground level. Probably this is why the agency built brick walls up to the sill level for surge protection. We have no complains that the door, windows and roof wall is not complete as each household were given 5,000 taka to complete the house by ourselves. We spent 2,200 taka to buy bricks and 300 taka to hire a rickshaw van for transport. We filled up the walls and now we will complete the door and windows with rest of the money. We plan to add a latrine later. At the moment we share a latrine with two other neighbouring families, as we do not have our own. The others in the neighbourhood who received different types of agency built complete or semi-permanent houses, also got latrines, cattle and water filter for individual houses. But we didn't receive anything else and still happy with the durability of this house as its an expensive structure built same way as a cyclone shelter.'

- A Core House Recipient Family

- *Disaster Preparedness*
  Very few agencies considered disaster risk reduction within their exit strategy. As disaster risk reduction is not only about providing a safe core house, it is important to ensure that the houses are maintained and repaired regularly. It was evident from the damage assessment that many of the houses lacked regular maintenance. The majority non-recipient community will continue to build themselves with no technical information and less durable materials, so it is important to support them. It is also important to ensure that the existing core shelter recipients also have shelter awareness training on how to repair, maintain and strengthen their houses. During cyclone, people are reluctant to leave belongings and livestock; therefore a follow-up plan for them to help themselves

should be considered in the exit strategy. Some agencies have already worked with the local disaster management committee and made people aware of the shelter evacuation need. It is important that the agencies are clear in defining their shelters as hazard resilient rather than calling it a hazard resistant structure for all types of hazard intensity. Building a surge resistant house is not feasible and therefore disaster preparedness planning to evacuate people for a safer location should be part of the shelter programme exit strategy.

Case 13: Shelter Awareness by Disaster Preparedness Training



Despite the well-reputed life saving early warning system mobilised by the Government of Bangladesh together with the BDRCS volunteers over the last 30 years, only 12% of the affected population went to the cyclone shelters and 23% stayed in their own house, while majority went to their neighbour's strongly built houses.[22] This shows the importance of preparedness and integrating risk reduction in family shelter design and construction programme.

BDRCS highlights the importance of safe shelter both for human and livestock in their disaster preparedness training. Partnering with IFRC, they also ensured that each core house owners receive training on how to make their houses stronger to prevent from future damage and to also build stronger extensions to their core houses. This kind of training costs very little, only 50taka per participants for the tea and snacks, as they are held within their locality. As a result more people are made aware on how to take measures to reduce future damage to their houses and environment.

Photo 16: Poster of the Safe Shelter Awareness and Repair Training (Source: BDRC-IFRC).

[22] See 'Chapter 1: Section 1.3, Early Recovery Assessment Findings, p 9.

3.4 Agency Case Histories: Product

3.4.1 Site Selection and Planning

The overall agencies response for site selection and planning was limited to the sites identified by the house owners. Very few agencies that worked with the landless families used the opportunity to work with the community, local partners and the local government to do a feasibility study prior to starting their shelter programme. Site selection and planning depends on a case-by-case basis of the site characteristics. If houses were not built on the previous land, the land preparation ended up as a time consuming process, which the owners had to take responsibility of, in order to provide a ground for agencies to deliver their prototype shelter. As the newly filled soil needs time to become a stable ground for construction, this later on affected the performance of the newly constructed house and latrines during the subsequent disasters like cyclone Aila or even the coming monsoon season or tidewater. In many occasions, the land shortages did not allow provision for individual family latrines. As a result, some agencies did not consider providing water sanitation facilities whilst the others provided water facilities and shared latrines in communal areas. The water sanitation facilities were not integrated with site planning. It was considered as a separate intervention that followed its own programme timeframe and was provided independently in most of the cases.

Case 14: Relocation Site Preparation

One agency built permanent settlements with brick masonry two room houses with a veranda. They also provided pit latrines with individual houses. The house-owners had to select the site themselves to protect their new settlement further inland from any future tidal surge. The community response highlights the need to integrate site selection and planning before any shelter reconstruction.

> *'We had to spend from 10,000Tk-80,000 Tk/ per family, by taking loans from many different agencies to prepare this relocation land. As we do not know if or when the surge protection embankment will be repaired. The agency who selected to work in our area, provided us with a permanent brick house worth 1 Lakh taka (100,000Tk) of which 10,000Tk is from our own funding, some of us decided to move to a safer ground. But now we are worried how to repay these loans*.'
>
> - Shah Poran Village Community, Mirzaganj

Case 15: Site Planning

One agency selected the marginalized and landless households as their shelter recipients who were mainly living in the government owned *khas* land. Initially, their partner NGOs started selecting *khas* land and involved the community and the local government for land validation process. They also discussed the process for land settlement and legal procedures to decide upon the programme timeframe. Following that, a multidisciplinary team did a feasibility study of these settlements for shelter reconstruction with architects, civil engineers, sociologists and disaster experts in order to see whether the existing *khas* lands are feasible enough to implement the intended shelter project. The architect checked the technical feasibility of the land to see how many houses could be planned, how much it will cost for transportation to these remote areas and how to manage sweet water in these saline coastal areas. The disaster expert considered the technical solution from hazard perspectives. When the land was provided, other challenges remained to use land more efficiently into plots of lands given on an individual basis and to make space for common services (e.g. a pond). It was not possible to bypass existing norms in order to do so. This made us realize, that further changes in law and procedures would be required to act on land recovery.

3.4.2 Shelter Design Options

The houses built by agencies fall in three types of structural categories,

i. Timber frame structure - as transitional or core shelter
ii. Cement pillar with timber posts and steel roof truss- as transitional or core shelter
iii. Brick Masonry or RCC frame structure with brick walls– as permanent core shelter

The majority of the houses found in the affected areas are timber-framed structure. Agencies that helped in repairing these types of houses had to calculate the materials requirement and assess the technical needs on a case-by-case basis with the help of local carpenters and builders. Although this option was a cheaper way to help a large number of people, it needed extensive field presence and monitoring. As a result of this, most agencies responded to the shelter recovery programme by building proto-type houses with 'one size fits all' approach. On the other hand the variation on house sizes and costs from one agency response to another brings into question the issue of equitable assistance.'

Case 16: Various Types of Shelters

House costs varied from 30,000 taka to 3 lakh (3,00,000) taka, due to different design objectives of the agencies.

Transitional Core Shelter

Photo 17: Timber frame structure - One room

Transitional Core Shelter

Photo 18: Cement pillar with horizontal timber members and timber roof frame- One room

Permanent Core Shelter

Photo 19: RCC frame Structre - One room

Permanent Core Shelter

Photo 20: Brick masonry structure - Two rooms with a veranda

- *Transitional and Core Shelter Design Dilemma*
  Many agencies jumped from emergency to permanent or semi-permanent reconstruction, while the majority focused on transitional measures. Although 'core shelter' indicates a more durable hazard resilient shelter option[23], few agencies opted to build permanent shelters as an advocacy towards better housing standards. Most attempted to build a larger number of transitional shelters[24]. As a result of this, the question of equity was a key concern from the affected communities point of view, as a vast number of them remained unassisted by any type of shelter response, either repair or rebuilding.

- *Standards and Technical Options*
  Many agencies were aware about the technical recommendation formulated by themselves as a shelter technical working group in line with Sphere Minimum Standards for covered living space in emergencies. But, it was not always possible to follow them as there were issues of land shortage and a lack of enough hands-on examples for demonstrating the techniques. This resulted sub-standard and less strong houses.

[23] Core Shelter- A small house of very strong cyclone-resistance materials that can be added onto by beneficiary households with storage spaces, verandas and extra rooms (Early Recovery Action Plan, MoFDM, Government of Bangladesh 2008).
[24] Transitional Shelter – Shelter, which provides a habitable covered living space and a secure healthy living environment with privacy and dignity to those within it during the period between a conflict or natural disaster and the achievement of a durable shelter solution ('Transitional Settlement: Displaced Populations, Corsellis & Vitale, Oxfam Publication 2005).

Case 17: Overview of shelters built against the Shelter Working Group's Minimum Standards

Shelter technical working group co-ordination mechanism facilitated to establish a minimum standard for core shelter construction, which was then endorsed by the Government of Bangladesh. Many agencies found this standard a useful reference for designing their prototype shelters. Performance of the core shelter built by agencies is compared in the table below by describing field observation next to the specifications.

Minimum Standards	**Construction of SIDR core shelter**	**Performance of the core shelter built**
Elements	**Specifications**	**Field Observations**
House Size	Considering scarcity of available land, resource constraints or other limitations the minimum house size shall be 10ft X 10ft (100sft=9.2sq.m). However, 10ft X 20ft size (200sft=18.4sq.m) house is preferred.	Shelter Working Group initially recommended: 3.5sq.m/person for emergency shelters and 4.5sq.m/person for transitional or semi-permanent shelter as per Sphere Standards. The specified space requirement of 18.4sq.m allows a family of four to occupy the space. Whereas, some houses have an average family of five users, for which they needed a two-room space or a single room house big enough to be partitioned.
Ceiling height	The minimum ceiling height shall be 8 ft.	Most house owners are yet to complete the attic space for using as storage.
Roof	• Sloping roof made of CGI sheet (0.35mm or 29 BS Gauge minimum thickness) with seasoned and treated hard wood rafters and purlins or steel frame (coated with metallic anti-corrosive paints). • All CI sheets shall be tied firmly with superstructure by galvanised iron by J-bolts and /or by any other recommended device.	• No mention of the minimum or maximum angle for roof slope. As the roof slope is a key issue for high wind performance. The main achievement though, was on agreeing the use of thicker quality CI sheet. As lighter CI sheet causes injuries by flying off during the high wind, and corrodes fast in saline coastal environments. • Although J bolt was used for fixing CGI sheet with steel roof frame, use of j bolts and metal straps for timber roof frame, specification and spacing of usage of screws with washer was needed.
Wooden Framing	All wooden structural joineries shall have adequate double-pinned lap joints. All frames shall have horizontal or diagonal bracings as appropriate. Lap joints shall be without reduction of timber sections.	Use of bracings was emphasised and practiced. As the detail description on the size of timber posts or joints and bracings are not specified. Many agencies could not achieve the technically sound structure with adequate joints, which needs further practical and photographic guidance.
Wall Cladding	Free Option	Untreated or low quality bamboo-mat walls or thinner quality CI sheet (0.18mm, 0.26mm) were used due to the lack of specification. The walls were not well connected with the frame of the house, allowing insects or rainwater penetrations and vulnerable to high wind.

Column/Pillar	Pre cast reinforced concrete pillars shall be cured for at least 14days before transportation. The specifications for the RCC pillars should be as below: • Clear cover to MS bar for concrete: - 1 inch for pre-cast concrete members above ground - $1^{1/2}$ inch for cast-in-situ concrete above ground - $1^{1/4}$ inch for pre cast concrete members below ground - 2 inch for cast-in-situ concrete below ground • Coarse Aggregate: ½ inch downgraded gravels/P.J bricks • Fine Aggregate: Clear river sand free from salinity having Fineness Modulus not less than 1.5 • Cement: Ordinary Portland Cement • Mild Steel: All Mild Steel shall be 40 grade (fy=40,000psi) • Mix Ration: Not less than $1:1^{1/2}:3$ • Slump for wet concrete: $1^{1/2}$ inches • Concrete Strength: Minimum concrete strength shall be 3,000psi.	• Some agencies ensured quality by mass-producing the pillars themselves following the prescribed standards. Some also introduced a T-footing to make it stronger at the foundation level. • Some cases female-headed households complained about the difficulty to carry it onsite, once it has been distributed by agencies to a nearest communal collection point. • Some agencies built shorter pillars or stumps to anchor the timber posts with metal clamps. These were easier options for transportation to the site and for fixing the timber frame houses, which were also widely used by local builders. Currently the timber posts are not buried on ground to prevent damage from water and termites. This option can also help in shelter repairing of the timber houses. • Detail joints for fixing the horizontal timber members and wall cladding were not provided, which caused most of the houses to have inadequate connections of columns with timber members, wall cladding and roof frame. A specification with detail drawings and photographic demonstration is needed in future.
Plinth	• The most preferred plinth is earthen plinth with five (5) inches brick outer wall with cement mortars (1:4). • For soil stabilised plinth minimum cement content shall be 5% • The minimum plinth height shall be 2ft from the Ground Level.	• House owners were satisfied with the brick bordered plinth as it prevented rats, thieves and tidewater. Need to mention the use of metal clamp to connect timber posts with brick plinth. • Soil stabilisation as it was not described in detail; this comparatively new technology was not used. • Agencies who built houses on mud plinth, the height of the plinth was not changed if they were built on original plinth, with few raising it higher. Shelter working group need to propose to raise it up to 3 ft height.
Foundation	Foundation depth shall be 1ft 6 inches from Finished Ground Level.	Sometimes built on original plinth and not any foundation.

- *Structural Assessment*
  Agencies sometimes hired external consultants or used their own technical expertise before the design was approved by the management and donors who were often from non-technical backgrounds. Establishing a benchmark could have benefited by indicating the capacity for flood and tidal surge protection as well wind resistance of the designed core shelters. In order to assess the structural performance and hazard resistance of the core houses, it is necessary to have a structural design for all types of shelters that has been designed, with detailed calculations for various loads (dead loads, wind loads). The design calculation or the assumptions based designs needs to be able to indicate the type of hazard class (for storm surge) or cyclone category the structure can be resistant to (Case

18). In the absence of such calculations, strength of wood and other basic values, it is not possible to determine the safety of structure for which it is designed. For example, some agency built houses could withstand cyclone Aila with a wind speed of 60mph[25], but this type of performance-based evidence is not enough for agencies to be able to determine the hazard resilient capacity of their houses.

Case 18: Core Shelters should to be able to indicate its Hazard Resistance Capacity

Hazard Class	Depth of Water (m)
1	Below 0.5
2	0.5-1.0
3	1.0-1.5
4	1.5-2.0
5	Greater than 2.0

Cyclone Category	Wind Speed
1	Strongest gust less that 125 km/h
2	Strongest gust 125-170 km/h
3	Strongest gust 170-225 km/h
4	Strongest gust 225-280km/h
5	Strongest gust More than 280km/h

Source: Cyclone Resistant Infrastructure Development Project[26]. Source: http://www.aoml.noaa.gov/hrd/tcfaq/D2.html

- *Construction Practices*
  The technical observations from the field visit and construction drawings indicate the performance against the shelter working group-determined standard (Case 17). The most common problems and some good practices are illustrated further (Case 19, 20):
  i. Foundation: Agencies involved the owners in preparing the earthen plinth or curing the brick plinths. The house owners often supplied the sweet water for construction from the nearby pond.
  ii. Roof: Truss is mainly built with timber or mild steel, prefabricated in workshops and welded on site. CI sheet was connected with J-hook in case of steel truss. Lack of frequent use of screws and the wedged shape screws were the common problems for the timber roof connection. Roofing sheet used by all agencies followed the minimum standard of 0.36mm with some providing thicker quality sheets.
  iii. Storage Space: Attic is an important storage space as well as a refuge space from rising surge water. This was rarely considered while designing the roof frame by most agencies. Provision of false ceiling was left for the owner to do, few provided an adequate sized frame to have enough storage facility. One agency provided a permanent flat roof with false ceiling for storage, which was not an efficient use of space although it was designed to reduce the use of CI sheet which causes injusries during cyclone.
  iv. Structure: Majority are post and beam structures with timber and RCC posts and few with brick masonry or RCC structures. Common problems of connecting RCC pillars with timber beams (Photos 27,30). In some brick masonry houses with freestanding brick pillars in the verandas, were built without any beam to reduce cost, and to provide future expansion option. Some households already added beams to it. In cases where permanent RCC frame is built, construction techniques to expand are not clear within the house-owners and the local construction workers.
  v. Connections: The main problems for a less strong structure are caused by ill connections of each member (Case 20). The steel roof trusses were not well connected with the RCC pillars (Photo 34). Metal straps were rarely used for stronger connections of roof and structure of the house, and for connecting posts with wall or foundation (Photo 29, 32). Wall panels (bamboo mat walls, CI sheet) were not well connected with the structure (Photo 31).
  vi. Bracings: GI wires used for cross bracing between cement pillars were not well connected and sometimes taken out while extending houses to make a bigger space. Use of wooden bracings is well understood as it's a local practice (Photo 23). Some of the agency built timber cross bracings were over engineered (Case 28).

[25] Cyclone Aila tests Oxfam houses in Bangladesh, Oxfam America, May 2009.
[26] Cyclone Resistance Domestic Construction in Bangladesh, J. Lewis and M.P Chisholm *in* 'Implementing Hazard Resistant Housing',S.M. Seraj and J.R. Choudhury (eds), BUET, DFID, Housing and Hazards, December 1996. p 31.

vii. Walls: Thinner quality CGI sheet was used which might be later on used for roofing extension. This may and cause the problem as thinner sheet fly off easily during high wind (Case 27). Similar problem can be furthered as many roof gable walls were not well-connected (Photo 31, 32). The quality of wall panels was not very good, as treated bamboo was not used due to the time constraints for mass production. Some house owners rubbed *Gab,* a local fruit, to prevent termite attack on the bamboo mat, which is a local technique. Brick walls not completed by some agencies, which raises the question of habitability, privacy and security (Case 14). Some agencies who provided a timber framed structure, mobilised the community to use salvaged materials to complete their walls prior to handover and completion of the construction work, so that the owners can move into the new house immediately (Photo 19).

viii. Doors and Windows: Doors and window positions are not well considered in some designs. House owners often preferred two doors one in front and one at the back, which sometimes they managed to negotiate. Corner doors are kept in few designs, which will reduce the rigidity or strength of the structure. Some designs had openings on all sides up to the sill level for owners to complete the rest. As openings are expensive they are filling the walls for security (Case 12). Net windows (Photo 23) and pivoted windows (Photo 22) were some good examples. Some complained about the structure or cross bracing coming on the way (Case 28).

ix. Quality: RCC pillars are of better quality when manufactured and supervised by the agency staff, compared to those available in the market. But in most cases, they chip easily and do not last in saltine environment. Although it is an alternative material to timber, it is not the most efficient solution. Therefore some agencies that managed to secure more funding for built brick masonry or RCC frame structures. Very few built timber frame structures from locally procured quality timber sources, as there was often problems to ensure that they are treated and not warped.

Case 19: Good practices derived from local techniques and past experiences

Top Photos
(21: left) Use of horizontal corner bracings in a timber frame house
(22: centre) Pivot windows that can be closed easily during storm
(23: right) Use of net in window for security, cross bracing to attach the wall, brick foundation for security, vector control and durability.

Bottom Photos (24,25,26): Improved connection of RCC pillars with steel roof, wooden beams and wall by using metal brackets and straps.

Case 20: Common Construction Problems found in the agency built shelters.

Poorly built houses are vulnerable to natural elements and theft. Due to the ill connections of its elements, the structure becomes flimsy despite using expensive materials such as metal truss and RCC posts. During cyclone, people are concerned about leaving their belongings behind. Therefore adequate storage space should be well integrated in shelter design.

Photo 27: Loose connection of timber truss or bamboo beams with RCC pillar, makes the structure vulnerable. Using metal straps instead of the flimsy ropes (as seen in the picture) could easily help to strengthen the joints.

Photo 28: Although timber truss is joined with nuts and bolts, the roof space cannot be used for storage, as there are no beams to build the attic space on. The owner hung thin bamboo poles with ropes to make some protection from heat with a lightweight mat.

Photo 29: Using nails to connect timber post with steel truss. Use of metal straps could easily strengthen this joint. (See Photo 38)

Photo 30: Connection of wooden members with RCC post by using nuts and bolts at frequent intervals makes the post less strong and easily breakable. Roof Truss Connection is joined with only one steel bar wrapped around the truss.

Photo 31: Steel truss with additional horizontal frames to use the attic as storage, although the bamboo mat is not well connected.

Photo 32: Connection problems for using three different types of materials: steel frame, RCC pillar and Bamboo mat wall.

3.4.3 Construction Options

Due to the construction boom, the local skill shortage affects the type of approach to be undertaken by agencies. Some agencies brought in workmen from other parts of the country, while the rest relied on a contractor driven approach to ensure efficient construction management. Materials and construction quality was monitored successfully by some agencies who managed the process themselves, whilst in the contractor driven approach, agencies had very few staff on ground and failed to achieve a high level of quality. One agency that delegated the responsibility to the owner was able to avoid much of the construction management challenge. But the quality of house was not satisfactory as the community were not mobilised or trained technically to ensure good supervision. Many agencies tasked the households in plinth preparation, assisting the workmen and supplying non-saline water for curing concrete work or brick plinth. But they were not given any supervision authority or responsibility. Monitoring of construction could be improved if the households were given a simple orientation and checklist to ensure quality and workmanship.

Case 21: Build Pilot Houses First

One agency learned from their experience by building twenty pilothouses prior to starting more than a thousand dwellings. Initially they tried to construct full houses by hiring one contractor. But as this failed; they contracted different components the houses to several contractors. For example, one contractor was responsible for producing the RCC pillars, one for erecting the structure, one for roof fixing and so on. This saved time and worked very well. This experience helped them to replicate a more efficient process to deliver quickly by mass production and multiple contracting.

Case 22: Prefabricated Construction

One agency setup their own production center with all modern workshop facilities (Casting RCC pillar, fabrication of RCC truss, welding facilities, carpentry workshop) in order to prefabricate all the shelter materials and to ensure quality control, volume and continuous supply. All the necessary production equipment such as welders, cement mixers, power tools and raw materials were procured from Barisal, the nearest largest city. These materials were then sent by boat or truck to be stored in a warehouse at the production center with a computerised record keeping system. This production center produced the materials for 100 core shelter kits every month and supplied directly to the site both by river and road. This project hired 100 local people as daily labours, who were trained by the skilled staff and engineers. Volunteers from overseas and the local workers built the houses within a week or less.

Photos 33,34,35: Production centre in Mirjaganj (Source: Habitat for Humanity International- Bangladesh)

3.4.4 Safe Building Promotion

Public health interventions like the provision of water and sanitation facilities are successful when they are associated with public health promotional activities like community awareness on hygiene practice and training on maintenance and repair of the facilities. Similarly, houses provided by agencies will need maintenance as many houses during cyclone season get damaged due to the negligence of repair and maintenance. Therefore it is important to include shelter awareness training as a safe building promotion activity. This can also be integrated with disaster preparedness training, as has already been done by one agency. Few other agencies also initiated house repairing associated with house-to-house monitoring. This type of initiative needs to be an integrated part of shelter reconstruction programme, be it transitional or permanent core shelter programme, as every house that is built will be extended and will need repairing in future.

Case 23: Basic technical knowledge components for 'Shelter Awareness Training'

Topics covered are,

- Roof
- Wall
- Joints
- Bracing
- Foundation
- Protection by vegetation
- Questions from participants

Photo 36: IFRC/BDRCS

Case 24: Shelter Repair Programme

The affected communities rebuild majority houses, as the agency built houses cannot cover the huge reconstruction need. Recognising this, one agency targeted a larger number of their shelter assistance for repair programme. They distributed tool kits to each family, together with 'Shelter Awareness Training' and cash grant for hiring labour and procuring materials. Prior to distribution were given orientation on their responsibility. Some families also used these tool kits to repair their houses after cyclone Aila in 2009.

Photo 37: Toolkit for each family
Source: IFRC/BDRCS)

Agency Responsibility:

1. Planning
2. Arrange location, date, time
3. Invite 25 beneficiaries
4. Prepare / Setup Technical Orientation
5. Do the Technical Orientation
6. Distribute toolkits
7. Visit houses individually

Owners Responsibility:

1. Use the toolkit and cash for the repair / construction of the house
2. Follow individual agreement (which items to be repaired)
3. Give assistance to monitoring
4. Keep toolkit for future use

3.4.5 Water Sanitation provision:
Agencies, who focussed on building a core shelter only, did not often fulfil the necessary requirements of a habitable house with services. They did not consider it as a mandatory process during their planning stage, although they do understand the importance of a house with kitchen and toilet. Some agencies spent their funding on building expensive permanent core shelters without latrines. In order to save money and time, those who built latrines with each house often did not pay enough attention to make it as durable as the shelters. Water facilities provided by agencies were mostly built like the pre-existing system of communal facilities available; such as pond sand filters or tube wells depending on the local water quality. Where land was available some agencies excavated ponds and some provided individual households with a rainwater storage tank and roof gutter. As there was not enough coordination with WASH Cluster, the technical information for provision of water sanitation and area-wise coverage was not well shared within the shelter providers both during the emergency and recovery phase.

Case 25: Design of Water Sanitation Facilities

One agency built individual rainwater storage tanks by collecting water through roof gutter of the houses they provided. This was very welcomed by the house owner, though they were not willing to share their water with neighbours. This brings the question of equity of assistance within the agencies, as the neighbouring households who were assisted by another agency did not receive such provision. This type of design can also be tested for community structures and within shared households, as the individual houses may not have enough land for such a large structure in many occasions (top photo: 38).

Although the Shelter Woking Group set a minimum standard height for shelter plinth (2ft), some agencies did not consider raising the latrine's plinth to a higher level as they continued building on the existing low height plinth (middle photo: 39). Others who provided latrines with individual houses sometimes had to build on new plinths and often on newly raised land, that later got washed away in tidewater. This shows the need for case-by-case solution in terms of dealing with flood or tide protection (Photo 40). Durability in terms of location and priority on plinth protection should be given while designing latrines. Rather than spending on materials for a permanent toilet wall (bottom right photo: 41), it could have benefited if the toilets were made usable during heavy flooding. Perhaps building a more durable brick bordered plinth *(semi-pucca styie)* chould be considered in latrine designs.

3.4.6 Public Health Promotion

Lack of public health promotion makes the house owners vulnerable to diseases and unhygienic practices. Public heath promotion is a well-established software component practiced by many agencies, but only a few are implementing the activities in parallel to their shelter reconstruction programme. Some agencies tasked their local partners to continue hygiene awareness activities as a software component. Others need to address the issue of maintenance of the water sanitation facilities they provided and integrate this as part of the shelter programme. B working together with WASH cluster, this effort can be strengthened and combined with Safe Building Promotion.

Case26: Maintenance

Maintenance of water sanitation facilities can only be ensured if ongoing promotional activities are widespread and community committees are tasked to do so. Some agencies are working on hygiene promotion activities with local partners, while other's who built latrines with their emergency funds have left or stopped funding their partners. For example, toilets built next to each other, due to lack of space and lack of proper planning, are now neither being used nor maintained. Lack of land resulted in building more than one latrine in same place. This clearly shows the importance of community mobilisation and participation in health promotion to reduce waste of resources. Therefore agencies need to follow up to assess the performance of their delivered products, which can be done through case-by-case analysis together with the house owner.

Photo 42: Latrines built without planning Morelganj 2009

3.4.7 Disaster Risk Reduction

Successful early warning system and disaster preparedness planning minimised the loss of lives and livestock. This initiative needs to incorporate hands-on construction for good practice demonstration as well as training on shelter awareness, which has been initiated by few agencies. However, during the programme planning and shelter design stage, there is a very limited awareness within the management and donor institutes on this issue, as they are not clear between the definition of hazard resilient and hazard resistance. The definition of a 'core shelter' addresses the issue of durability and hazard resistance but as most of the donors are familiar with the term 'transitional shelter', they often compelled the agencies to build a larger number of such shelters (Case 29). As a result, some transitional shelters lacked structural soundness and hazard resilience. The quality was compromised to provide a minimal sub-standard shelter to as many affected families as possible. Although by this approach the agencies covered a mid term need for the households, the longer-term performance against hazards made these houses prone to damage in the next annual storm or cyclone. This problem can only be addressed by sharing experiences and getting feed back from the local

builders and house owners. This can help agencies to prioritise and to improve the technical quality and also to save budget on unnecessary expenses in future.

Case 27: Build Back Better?

'For our transitional shelter recovery programme, we provided thinner CI (0.28mm) sheet for the wall, although we followed the Shelter Working Group recommended minimum standards 0.36mm for the roofing sheet. But I can foresee people using this thinner quality sheet for veranda roofing when they extend their houses in near future. I'm worried that it might repeat the same problem of thinner CI sheet flying off and injuring people during cyclone. I also learnt that by distributing the shelter materials and by letting community build, we can ensure a fast completion of the programme, but we were not be able to ensure a stronger house construction, as the carpenters were often too lazy to use sufficient number of screws for roof fixing. Next time we need to ensure that we invest more time on community mobilisation so that people can build back better by themselves'.

- An Agency Field Staff

Case 28: House Owners and Risk Reduction

Photo 43: Extension of the house used split bamboo for cross bracing.

Photo 44: House owner not sure how to put the windows on without damaging the structure

'I received this timber frame structure built by an agency, as my house was totally destroyed by cyclone Sidr. I added the CGI sheet walls and the veranda myself from the salvaged materials of my destroyed house But I'm not sure how to put on any windows, as the house gets quite hot now. I'm afraid to take off any of these wooden cross bracings, to put windows on the wall. As I am fear that my house might fall down or it might break the structure, which is quite strongly attached together. The NGO 's staff explained its importance to me, I also added the cross bracing in the veranda which I believe it will make my house strong to prevent from next cyclone.'

- A Female Headed Core House Owner

3.4.8 Owners' Response

User's satisfaction can be measured in terms of the habitable quality of the house. As majority of the affected households did not get any kind of formal shelter assistance, those who were lucky to be selected for shelter reconstruction were happy with whatever type of shelter they received with very few complains. Most turned their core house or transitional house into a home by building storage, extra rooms and planting a vegetable garden.

- *Participation*

Although agencies did not prioritise community involvement in the strategic planning, by ensuring owner's participation on the design, construction supervision and monitoring process, the house-owners still took the major initiative to improve their living condition. They took loans to relocate themselves, to prepare the site and to extend the house. They assisted the construction workers by supplying sweet water for RCC construction and curing the brick plinths or walls regularly. The female-headed households obviously needed more technical information and manual support, which was not prioritised by many agencies.

- *Post Construction*

Agencies built various types of houses, which raises the question of unequal distribution of relief assistance. Sometimes a positive competition amongst the neighbourhoods on various types of shelter recipients drove them to improve or to extend their houses with little resource they have. Most agencies did not provide livelihood opportunities with their shelter programme, but house owners are saving money or taking loans for house improvement. In cases where permanent type houses were built, house owners were unable to extend and add space fast, as they will need to invest more than an average rural house extension. This will be hard for them to do without technical advice. Some donors and the implementing agencies did monitoring and evaluations but most have not done a follow-up or post construction monitoring in order to ensure a better quality and improved living standards.

Case 29: House Extension

Photo 45: House extension using local construction skills

'My house was re-built by an agency on my previous house plinth, with a room and a veranda. During the construction work, I had to bring the shelter materials by myself with my two children, as the agency delivered them to a common collection point and provided me the money to hire transport. The RCC pillars were so heavy to carry even from the nearest road that for the next two days I was laid with back pain and could not move. Now I have changed the look of the house from a 'relief house' to a home, as my daughter is getting married soon. I hired carpenters and worked myself with the children to turn the veranda into an extended room and add a kitchen on the side.

- A female headed house owner

Chapter 4: Conclusion

The chapter draws conclusion on the learning from cyclone SIDR family shelter reconstruction experience. It also indicates the key challenges of reconstruction in a post-disaster context where the natural disaster is a regular annual event in Bangladesh. How these challenges can be addressed are summarised in the discussion point.

4.1 Overview

Every year Bangladesh faces an average of 1.3 tropical storms or cyclones in addition to annual flood and river erosion.[27] Since 1970, the country has lost an average of 0.3 million houses fully and 0.5 million partially per year by flood and cyclone.[28] As a result, the coping mechanism and resilience of the affected population for self recovery is very high compared to other countries that recently faced sudden natural disasters in Asia. Altthough there has been a significant improvement in sectors like public health, family planning, primary education, micro-finance and empowerment of women, the shelter or housing sector fall behind drastically due to the ever-increasing population and migration. As natural disasters and migration are interlinked, the housing shortage was estimated to be 5 million in 2000.[29] This indicates the need to build at least 4 million new houses per year to keep pace with the ever-increasing population.[30]

Following cyclone Sidr the Government, international community and local agencies addressed the post disaster shelter need in various ways. During the emergency phase they delivered cash grants and shelter materials for rebuilding and repairing. Later on, core houses and transitional houses were built for targeted vulnerable families in the affected areas. However, this direct reconstruction assistance covered a limited need in comparison to that of the total shelter reconstruction needed. The majority of housing reconstruction was owner driven without any external assistance form the government or agencies. Although the cyclone Sidr early recovery strategy emphasised on the self-recovery with the building of model houses meant to demonstrate hazard resilient construction practice, this strategy was not applied by the shelter providing agencies, including the government. This was due to the absence of any good practice that can be replicated as well as having limited knowledge on implementing 'Owner Driven Housing Reconstruction' or 'self-help' housing schemes. Assisting a larger number of affected households through shelter awareness and construction training could have accelerated the reconstruction process but this was undertaken by very few agencies.

Cyclone Sidr affected families had shelters delivered as a relief product rather than by following a developmental relief process. In order to raise fund from external donors, the agencies' shelter delivery programme focused on building prototypes, which sometimes addressed hazard resilient design considerations. This prototype was sometimes of transitional nature and sometimes of semi permanent or permanent nature. The confusion of defining a shelter programme prevailed all through the design stage because it was not well defined at the strategic planning level. Many agencies were measuring the houses built in terms of durability whilst taking into account the donors' expectation to provide shelter for a significant number of the affected population as a transitional measure. Very few agencies carried on extensive house repair work as their focus was primarily on designing prototypes that could be replicated for all sites, despite of knowing the logistics challenges ahead of them for bulk procurement, transportation to site and construction quality control for each site. Shelter reconstruction was seen as a low-cost construction project, which was often done by the contractors due to the difficulty of construction management by the implementing agencies or the even by the

[27] Draft National Disaster Management Policy, Government of Bangladesh, January 2008, p3.
[28] House owners can solve key humanitarian challenges in post disaster construction in Bangladesh: Lessons from use and non-use of ODR in participatory environment, K. Alam *in* 'Development From Disaster: Scaling Up Owner Driven Reconstruction Conference', London 2008.
[29] The Daily Star, February 01, 2002 quoting a World Bank report *in* Rights to Shelter: Bangladesh, R. Nawaz, in 'Adequate and Affordable Housing for All Conference', Toronto, 2004.
[30] Strengthening the Role of Private Sector Housing in Bangladesh Economy: The Policy Challenges, CPD dialogue report 64, p2, 3, November 2003.

government themselves. The house owners had limited authority in decision making on the house type, design and construction process. Instructions and preconditions were given to the house owners to acquire suitable land, raise their plinth for the house to be built on. In the end most of the house owners were happy to have a roof over their head, even if some of the delivered houses were neither complete nor durable. Those who received a strong core shelter were confident about its durability and do not feel the need to seek a safer refuge during future cyclones. This raises the issue of disaster preparedness planning and need for the shelter providers to be clear about the extent of the cyclone and tidal wave a core house can withstand. As many houses built in the coastal area are prone to high storm surge during cyclone, building a house alone cannot address disaster risk reduction holistically. Therefore, environmental planning and clear information on the houses capacity for ensuring safety need to be integrated with shelter programme.

4.2 Challenges and Learning

The key challenges identified in the areas of strategic planning and programme planning.

4.2.1 Strategic Challenges and Learning

- *Policy, Guidelines and Advocacy*

Lack of clear reconstruction policy from the government and a delay to formulate technical guidelines by the Shelter Working Group, was seen as one of the key challenge by many agencies. The shelter-working group was formed by the implementing member agencies as a learning platform to share information and also to establish a technical sub-working group to identify hazard resilient construction options. This group proved to be useful for some of the member agencies that undertook core shelter response.
Another sub-working group was established within the shelter-working group, to look into the housing need of around 30% of the affected population who are landless and to provide shelter and settlement planning options. Due to the lack of any donor funding and less interests among the working group members to be engaged on policy issues, this group dissolved after few months. Despite of this, some agencies found their way to provide shelter for the landless families by working with the local government. An agency emphasised the advocacy need for post disaster shelter strategy,

> *'We do not have a housing policy for the post disaster context to ensure the rights of the most vulnerable people, but we are now working with the government on it.'*

- *Leadership and Coordination*

During the cyclone Sidr recovery, an interim government was running the country. This void in national leadership affected the reconstruction and recovery co-ordination. This is evident in the deadlock of the Indian government funded housing scheme, as the families, who were selected to receive Shelter Assistance from the Government of India are still without a house. Even after cyclone Aila in May 2009, the lack of strategic leadership resulted in less donor interest and less fund mobilisation. On the other hand, the Shelter Working Group established after cyclone Sidr is still proactive for ensuring a continuation for a co-ordinated recovery and reconstruction process by its member agencies as stated by the shelter working group coordinator,

> *'For the first time in the disaster response history in Bangladesh, we were able to coordinate and respond to the family shelter need in an organised way. I hope we can continue this effort, as majority of the affected families are still in need of houses.'*

- *Land Issues*

Most agencies were unable to work for the landless due to the strict programme timeframe set up by their donors. Although they realise that majority of the vulnerable and the poorest population are those who live outside the storm surge protection embankments with many living on government owned *Khas* land (some for more than twenty years). Only three implementers (including the Government) directly addressed the issue whilst the rest preconditioned their shelter recipients to produce any form of land agreement document (rental, tenant or owner)

before they could receive any house. Currently, only one agency is continuing its advocacy work with the government to address shelter need of the landless population. They also mobilized the community with the help of local agencies working in the area to press the local leaders to address their need. They did this by saying that they will not vote for him unless their legal land ownership process are not taken care of. This sets a good community empowerment example by using post-disaster time pressure and political interest in favour of urgent shelter need.

- *World Economic Recession and Donor Fund Allocation*

Many national and international agencies' programme strategy is determined by the fund they secure from the international donor agencies and governments. Due to the world economic recession, the amount of funds raised by the developed nations and donors were less compared to the past funding received for post-disaster reconstruction. With Bangladesh being in the regular need for post-natural disaster recovery, the development funds are often channeled towards the immediate recovery from post disasters. This may slow down the countries overall development process.[31] Many agencies felt that the donors were mainly interested in investment for immediate recovery rather than looking at a long-term sustainable solution and this has also affected the quality of shelter delivery.

- *Disaster Risk Reduction and Environmental Sustainability*

The coastal zone of Bangladesh is high risk to cyclone and storm surge. Therefore, environmental protection is essential for its recovery. Embankment building is a high cost engineering and infrastructure solution, which is often beyond the scope of shelter providing agencies to implement. Building multi-purpose cyclone shelters are high tech and high cost solutions, which have been saving lives in the past disasters. Although smaller number of population took refuge in them due to their absence in many areas, travel distance to reach them, privacy and lack of maintenance within them, community inclusion for proper planning and maintenance of the cyclone shelters is a necessary risk reduction measure. On the other hand, planting trees and protecting the existing embankments are low-key interventions but can protect the coastal settlements from wind and storm surge as well as reducing carbon footprint from the construction work. Therefore it is essential to incorporate environmental management with shelter programme, which is yet to be done both by the government and the agencies working in the area.

- *Accountability and Transparency versus Corruption*

House owners as well as the wider community accused some shelter providers with corruption. Many of the shelter providers did not inform on the progress of the shelter delivery to their senior level management or donors, due mainly to the lack of a systematic reporting mechanism. The house owners often did not know what type of assistance they would receive and when. Due to the remoteness of the site, many shelter deliveries were left on the hands of the professional contractors to achieve efficiency. There has been very little amount of regular monitoring of the process by the donors or the implementers themselves to tackle issues of corruption and favouritism during household selection, materials procurement and contractor selection process.

4.2.2 Programme Challenges and Learning

- *Contingency Planning*

Contingency planning is part of disaster preparedness planning, which has not been integrated by many agencies prior to cyclone Sidr response. Despite the fact that natural disasters are annual phenomena, agencies were not well prepared to respond to post-emergency shelter delivery or transitional shelter recovery, as an agency staff commented,

> *'We wasted a lot of time in the beginning to respond to the shelter need. If we were able to make decisions faster, then we could have responded to the shelter need earlier.'*

[31] Disaster Management Policy Draft, Government of Bangladesh, January 2008. P5.

However, since the super cyclone Groky in Bangladesh with 138,000 deaths in 1991, there has been significant improvement in the present day disaster preparedness measures. Over 3 million people were helped with government and agencies early warning measures to take refuge in safer locations. This was a learning experience for Bangladesh as well for the global humanitarian community when a lesser category super cyclone struck the neighbouring Myanmar killing 100,000 people. This disastrous outcome was due to the lack of preparedness and planning.[32]

- *Assisting self-recovery: House Repair Kit and Training*

Most of the households started the re-building themselves out of the salvaged materials from the destroyed houses within a week after the cyclone. To accelerate this process, a few agencies distributed shelter kits to the affected population for self-recovery and shelter repair. Some continued this even after the emergency and early recovery phase, to facilitate the reconstruction process for a larger number of households. The procurement of shelter material like CI sheet, fasteners like nails and screws and toolkits were time consuming as the supplier had to manufacture them in bulk quantity, for many different agencies. Although distribution was delayed, this approach paid off in the end as an agency comments from their recent experience,

> *'The toolkits we distributed to each families were used for repairing the damaged houses for Cyclone Aila this year.'*

This experience made some agencies stockpile house repair kit in a pre-cyclone situation. Sometimes, the list of toolkits was not prepared in consultation with the community and some houses were not well repaired. This emphasises the need to consult the community while preparing the tool kit list. This approach perhaps could be strengthened by the shelter working group further. As well as sharing the learning from the shelter awareness training experiences by some agencies.

- *Materials and Access*

Procurement and delivery of quality materials in bulk was identified by the implementing agencies as the biggest challenge for family shelter reconstruction. Although procuring materials locally is often a better option for contributing to the local economy, the quality materials in bulk were not always available in the local market so the agencies had to procure them directly from the manufacturers. The cost of the materials also rose due to the demand for construction. Even for the mud plinth preparation by the house owners, there was not enough soil available to raise the plinth. The remoteness of the areas was a challenge for delivering the materials to scattered locations. Therefore agencies delivered materials to a common point and gave cash to the owner to enable them to transport the materials to their house location. This was difficult for many female headed, disabled or elderly households. The quality of delivered materials was sometimes not monitored and this resulted in substandard products being delivered by the suppliers, for which house owners did not have any complaints system in place.

- *Climatic and Seasonal Barriers*

The construction of rural housing in Bangladesh takes place in winter coincided with the Cyclone Sidr which struck in mid November 2007. Within a year, the next cyclone Reshmi also hit the coastal zone and was followed by Cyclone Aila in May 2009. Although these cyclones had less severe destruction than Sidr, the response to Cyclone Aila did pull some resources and staff. This resulted in the agencies not having enough time to learn from the Sidr experience to use it for Aila response. For Sidr reconstruction, there was a time constraint which meant there was a need to start reconstruction in early 2008 before the rainy season came in midyear. Due to the rainy season, the construction pace slowed down as the brick factories stopped production and RCC construction became difficult. Some agencies that undertook permanent or semi permanent construction in the remote *char* islands used the rainy season to their advantage. They stored the sweet water from rain for construction as in dry winter season it is difficult to have non-saline water from any nearby sources.

[32] A Review of the IFRC-led Shelter Coordination Group -Bangladesh Cyclone Sidr Response 2007-2008, S. Davidson, 2008.p13.

- *Construction Process*

The tendering and contracting process was a key challenge for majority of the shelter construction project implementers. As the local partner agencies have limited capacity to implement construction projects, most of the family shelter construction was contractor led. The contractor often delayed their response and many were not available due to the huge demand in the re-construction sector. Some agencies learnt to achieve efficiency by contracting several construction firms to deliver faster. Some had to deal with less skilled contractor who was inefficient in staff and labour management. The implementing local partners also were having problems of being expected to work as sub-contractors by the lead agencies, as expressed in their comment,

> *'We as local partners were given a prescribed design to construct houses according to the lead agency's design. Our feedback and opinion were not often taken into consideration for design improvement. We are good at community mobilisation, but our strengths were not often well-utilized, as we were also tasked like sub-contactors.'*

- *Ensuring Quality, Standards and Equality*

Delivering shelter for the post Sidr response did not have a strategic time limit as it depended on the funding timeframe. Delivering temporary or transitional shelter within a year after the disaster and then replacing it by permanent houses is the most desirable option but this works only when the fund is well secured. Due to the scale of disaster, the agencies were delivering shelters to maximum numbers of families possible and were not often committing to improve their design details and specifications to ensure safety from future hazards. The donors also wanted them to build 'transitional shelters' in order to provide roof over a large number of population. The Sphere Minimum Standards In Emergencies were challenged and sometimes taken literally as stated by an agency staff,

> *'The very concept of 10' X 15' house size came from such miscalculated Sphere Standard. Also during development of minimum standard latrine was not incorporated which some critique will find it unacceptable practice.'*

- *Technical Expertise and Practical Examples*

During the recovery phase, those who committed to 'build back better' were slower to respond, but achieved comparatively sturdier semi-permanent or permanent 'core shelter' solutions based on their available funds, investing on technical expertise and had a monitoring mechanism in place to ensure quality. This raises the issue of achieving a more defined programme standard in future, as so far the technical standards derived from shelter working group emphasised only the specifications and minimum requirements. Further work on defining the response, its time frame and investment on technical staff, practical demonstration, pilot training and monitoring checklist could have ensured both equality and quality of assistance. This can only happen when the shelter providers themselves acknowledges their challenges, as stated by one agency's technical specialist,

> '*There is a huge gap of technical understanding of Shelters. For instance, even some of the reputed agencies do not have an understanding of foundation and plinth. A lot of them are emotionally attached to pre cast columns while having no proper footing.'*

- *Professional Commitment*

Engagement of built environment professionals (engineers, planners and architects) with local expertise plays essential part for a quality shelter programme delivery. In the current disaster management arena, a lot of non-technical staff are involved in shelter projects undermining technical assistance needed. This is also true at donor level who only rely on external consultants for evaluation of the projects but not paying enough emphasis on having any full time staff for the initial programme advise and development phase with the government or the implementing agencies.

4.3 Recommendations

The shelter providers in future need to address the following issues below,

a) Disaster Risk Reduction: Disaster Risk Reduction is in the mandate of both national government and international community although there is a lack of any precise housing specific component for post disaster or pre-disaster scenario. A draft National Disaster Management Policy was established in January 2008, whereas the National Housing Policy (1999) emphasised disaster-affected communities' right for adequate shelter. In reality, there is no programme guideline or good practice examples for helping communities to re-build better themselves, apart form delivery of relief items or building houses as a top-down process. The agenda to 'building back better' and improving future resilience to disasters is agreed under the 2005 Hyogo Framework for Action both by the donors and governments from many countries. Therefore following action for a holistic shelter approach needs to be considered,

- National Post Disaster Reconstruction Policy and Guidelines should indicate various options of family shelter assistance in consultation with house owners, the agencies, donor and the government.
- National Housing Policy to be exercised for the landless population: Settlement planning for the landless should be an ongoing process involving the government, agencies and the landless families.
- Legal advocacy work should continue for land rights of the landless marginalized families by working together with the shelter cluster and involving local government, local agencies and the communities.
- The donors and the central government should prioritise contingency planning so that agencies together with local government and the communities are well prepared to respond effectively from recovery to reconstruction phase.
- Donors need to have tangible commitment to implement the 'build back safer' strategy into action and to lead a flexible process to accommodate various types of shelter assistance options (not only transitional measures, but also permanent housing) with flexible timeframe.

b) Cultural Acceptance: Only 12% of the coastal population went to the formal cyclone shelters while the rest took refuge in a nearby stronger house or stayed in their own houses until the surge water came in as seen in the Early Recovery Assessment findings.[33] Therefore it is important for agencies to address the disaster preparedness within their programme planning. The partner agencies have a key role to play in community mobilisation and empowerment to address the issues of transparency and accountability. During cyclone Sidr reconstruction, agencies were unable to empower the communities, as they were not in charge of the reconstruction process. As only 5% of the affected families received a shelter, they are happy to have a house, while many families are still without any adequate shelter and water sanitation facilities. Some agencies are still continuing to assist by building more shelters. As time goes by, the quality of agency provided houses are changing from transitional to semi-permanent and permanent. This raises the issue of inequality of assistance, which the agencies need to address carefully in order to avoid conflict and jealousy within the communities. Therefore agencies and the government need to address the following issues,

- Develop a people centred and bottom up reconstruction process for future responses.
- Community Action Planning and environmental assessment to be done prior to any shelter reconstruction project.
- Follow-up and address the issue of unequal shelter response by having a community-led evaluation on 'what worked well and what did not; how else to respond'.
- Community capacity building for advocacy on land rights and for making local government and local agencies accountable.

[33] See 'Chapter 1: Section 1.3, Early Recovery Assessment Findings, p 9.

- Community awareness training and construction capacity building on how to build stronger houses by improving local construction practices.
- Environmental Resource Management (ERM) and. Focus on environmental health and environmental protection measures.

c) Structural Soundness: The Bangladesh National Building code only emphasises on the standards for permanent or *pucca* houses, which are termed as engineered or semi engineered construction. They are mainly seen in peri-urban and urban areas. There are practice based technical references and guidelines produced by agencies in the past which emphasises multiples options for strengthening the rural *kutcha* houses. Building family shelters for the most vulnerable families as a core house is a good approach but it is not realistically feasible to provide each of 11.5 million affected families with such an expensive structure. Therefore the need for building back a safer coastal community is essential. This can only be done if the agencies focus their programme strategy to look holistically and also by facilitating communities to build themselves with basic technical training on how to make their houses resilient from the frequent hazards.

Some agencies who raised further funds are now continuing to build permanent houses for families who did not receive any shelter assistance two years after the cyclone. The donors are also providing technical monitoring support for these house designs. But what is needed is a combined effort to ensure a better quality design details and technical monitoring standard. As mass production of houses so far was lacking quality control and supervision, this should be prioritised for the core shelter construction project delivery.

- Define and set a benchmark and timeframe for types of shelter responses- Core, Transitional or Permanent.
- Communities and agencies themselves should understand the hazard resilient shelter construction practices through field research and technical hands on workshops.
- Structural calculation of various types of core houses should be done to measure cyclone and tidal surge resilient capacity, before they can be termed as a ‘Core House’.
- Engaging academic institutes and structural engineers to explore on sustainable building materials improvement and to understand ‘non-engineered’ and ‘owner-built’ housing construction process.

Glossaries and Acronyms

Agencies: The Non-Government Organisations (NGOs) and Red Cross and Red Crescent Societies who are implementing family shelter housing recovery and reconstruction programmes are termed as agencies.

Partner Agencies/ Partners: The local NGOs or National Societies like Bangladesh Red Crescent Society, who worked with international agencies to implement housing recovery and reconstruction programmes are termed as partner agencies.

Build Back Better: A concept used for disaster recovery process both by the national government and international community.

After the 2004 Indian Ocean Tsunami, United Nations Secretary General tasked former US President Bill Clinton as a Special Envoy to oversee Tsunami Recovery. His task was to ensure a developmental and well-collaborated reconstruction effort. Ten Key Propositions were produced for a 'Build Back Better' Strategy in December 2006, which captures the key lessons from the Tsunami Recovery.

Following the 2005 Earthquake in Pakistan, The Government of Pakistan undertook an 'Owner-Driven Reconstruction and Recovery Strategy', which is also titled as 'Build Back Better'. As a result of this the rural housing reconstruction of 600,000 houses were the implemented by the house owners with equal amount of financial assistance from the government in instalments, while the agencies on ground trained the construction sector and the house owners to build earthquake resistant houses.

Build Back Safer: The term emphasises a more tangible recovery from disasters. Lessons from the recent disasters shows that the recovery process often undermines the safety aspect of recovering towards a better condition, which often makes the communities more vulnerable to future disasters. Therefore many argue that 'Build Back Safer' should replace the 'Build Back Better' concept.

CGI sheet: 'Corrugated Galvanised Iron' sheet used mainly as roofing materials. Most of the CGI sheet manufactured in Bangladesh are not always galvanised, thus some agencies used the term CI sheet.

CI sheet: 'Corrugated Iron' Sheet are not galvanised and are comparatively lesser quality than CGI sheet, as the thinner quality sheets may be prone to rust in saline environment quicker.

Contingency planning: A management process that analyses specific potential events or emerging situations that might threaten society or the environment and establishes arrangements in advance to enable timely, effective and appropriate responses to such events and situations. (UNISDR, 2009)

Core Shelter: A small house of very strong cyclone-resistance materials that can be added onto by beneficiary households with storage spaces, verandas and extra rooms. (Ministry of Food and Disaster Management, Government of Bangladesh 2008)

Cyclone Shelter: Strong RCC buildings which have multi-purpose use as schools, community centre or offices during most of the time. During cyclone seasons, the coastal communities are given early warnings to take refuge in these cyclone shelters. In Bangladesh, many lives have been saved during super cyclones, when houses are wiped off by tidal waves and damaged by strong winds. This high cost solution sometimes is not the preferred solution by coastal communities, as they do not want to leave their assets and livelihoods behind during cyclone. Due to lack of insufficient space and privacy, many coastal communities choose to take refuge to a nearby strong house. As a result of this, the 'Core Shelter' concept was established for communities to have a safer refuge option within their village.

DER: Disaster Emergency Response, a team working under the United Nations Development Programme (UNDP) in Bangladesh.

DMB: 'Disaster Management Bureau' works under the Bangladesh Government's Ministry of Food and Disaster Management, in order to manage the relief and recovery coordination with the agencies.

DRR: 'Directorate of Relief and Rehabilitation' works within the Disaster Management Bureau, Bangladesh.

DRR: 'Disaster Risk Reduction' is 'The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events'. (UNISDR 2009)

Engineered and Non-engineered Construction: Construction undertaken by using modern materials like, brick, cement, steel are termed as engineered. This is because the construction of traditional and indigenous building materials is undertaken by local inhabitants, using local skill set. The engineering education and profession who are trained to build and calculate structures designed with modern materials term the rural and traditional buildings as non-engineered construction due to the lack of technical research and understanding on indigenous materials. (Wind Resistance of Non-Engineered Housing, A.M.M.T. Anwar, *in* 'Implementing Hazard-Resistant Housing', Housing And Hazard, DFID, BUET, December 1996)

Environmental Impact Assessment (EIA): Process by which the environmental consequences of a proposed project or programme are evaluated, undertaken as an integral part of planning and decision-making processes with a view to limiting or reducing the adverse impacts of the project or programme (UNISDR 2009)

Hazard: A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. (UNISDR 2009)

Housing: Lodging, shelter for human habitation. The immediate physical environment, both within and outside of buildings, in which families and households live and which serves as shelter, also, a government project to provide shelter to low-income groups. (UN-Habitat, 1992)

Hyogo Framework of Action 2005: A few weeks after the Indian Ocean Tsunami, 168 governments participated in the World Conference on Disaster Reduction, in Kobe, Japan, and agreed to the 'Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters' with five priority areas. This was based on the review of 'The Yokohama Strategy for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation and its Plan of Action ("Yokohama Strategy"), adopted in 1994.

***Khas* Land:** State land under administration of Ministry of Land (MOL), Government of Bangladesh, arising either from new formation or seizures in excess of 33.3 acres ceiling under land reform legislation.

***Kutcha* House:** The word *Kutcha* means temporary in Bangla. Therefore the *Kutcha* House is referred to the houses, which are of temporary nature. These houses are often mud plinth hut, built with locally available materials, like tree trunk, timber or bamboo for posts and split timber, cane or split bamboo sticks for roof frame. These houses mostly have coverings of leaves or mats, plastic sheets or low quality iron sheets. 70% of the damaged houses in cyclone SIDR were *Kutcha* as per Cyclone Sidr Early Recovery Assessment findings.

***Pucca* House:** The word *Pucca* means permanent in Bangla. Therefore the *Pucca* House is reffered to a house, which is permanent. Permanent building materials like, cement, steel and bricks are used to build *Pucca* Houses, which are beyond the means of the majority rural population in Bangladesh.

Public awareness: The extent of common knowledge about disaster risks, the factors that lead to disasters and the actions that can be taken individually and collectively to reduce exposure and vulnerability to hazards. (UNISDR 2009)

Reconstruction: Action of constructing one or more new buildings to replace buildings which have suffered damage, or repair of damaged buildings. (UN-Habitat, 1992)

Recovery: The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors. (UNISDR 2009)

Resilience/ resilient: The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to

increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures. (UNISDR, 2009)

***Semi-pucca* House:** Semi-permanent houses have a durable plinth, often a brick bordered or cement sand coated plinth, with cement or timber columns or half brick walls. Owners can make these houses to a permanent one by saving money and building up the walls with brick. In the coastal area, timber frame house with a permanent or durable plinth and iron sheets for covering are regarded as a *Semi-pucca* house. 30% of the damaged houses in cyclone SIDR were *Semi-pucca* houses.

'Shelter Coordination Group' and 'Shelter Working Group': SCG or Shelter Coordination Group was first time activated in Bangladesh after cyclone Sidr in November 2007. It is convened globally by the International Federation of Rec Cross and Red Crescent (IFRC) as a Emergency Shelter Cluster and later on handed over to the United Nations. The United Nations Development Programme, along with its Disaster Emergency Response Facility, now co-chairs the Shelter Coordination Group with the Director General of the Disaster Management Bureau of the Government of Bangladesh chairing the group. The members of the Shelter Working Group are voluntary and their initiative to share information and learning helps to ensure a coordinated shelter recovery effort.

Shelter Cluster: Global Emergency Shelter Cluster for post natural disaster response is lead by International Federation of Red Cross and Red Crescent Society (IFRC), while UNHCR leads the Shelter Cluster in post-conflict responses. After the emergency phase is over, UN agencies who are present in country takes over the responsibility of coordinating the Shelter Recovery Effort and acts as the leading agency for post natural disaster shelter response.

Shelter: In the context of disaster recovery in Bangladesh shelter is regarded as a 'Cyclone Shelter'. But in this document shelter is regarded as a family dwelling unit or a house, delivered by the government or agencies to the disaster affected families, to meet their basic need.

Shelter, adequate: Immediate environment for all aspects of family life, providing protection from the elements, secure tenure, personal safety, access to clean water and sanitation, proximity to places of employment and educational and health care facilities. (UN-Habitat, 1992)

Settlement: Area and location of dwelling units and systems to maintain them. (UN-Habitat, 1992)

Sphere: Sphere is based on two core beliefs: first, that all possible steps should be taken to alleviate human suffering arising out of calamity and conflict, and second, that those affected by disaster have a right to life with dignity and therefore a right to assistance. Sphere is three things: a handbook, a broad process of collaboration and an expression of commitment to quality and accountability.

The initiative was launched in 1997 by a group of humanitarian NGOs and the Red Cross and Red Crescent movement, who framed a Humanitarian Charter and identified Minimum Standards to be attained in disaster assistance, in each of five key sectors (water supply and sanitation, nutrition, food aid, shelter and health services). This process led to the publication of the first Sphere handbook in 2000. It has been reviewed in 2004 and is again undergoing second review process. (http://www.sphereproject.org/)

Structural and non-structural measures: Structural measures: Any physical construction to reduce or avoid possible impacts of hazards, or application of engineering techniques to achieve hazard-resistance and resilience in structures or systems; **Non-structural measures**: Any measure not involving physical construction that uses knowledge, practice or agreement to reduce risks and impacts, in particular through policies and laws, public awareness raising, training and education. (UNISDR 2009)

Transitional Shelter: Shelter, which provides a habitable covered living space and a secure healthy living environment with privacy and dignity to those within it during the period between a conflict or natural disaster and the achievement of a durable shelter solution. ('Transitional Settlement: Displaced Populations, Corsellis & Vitale, Oxfam Publication 2005)

WASH Cluster: Water, sanitation and hygiene promotion activities in post-disaster relief and recovery is globally coordinated by the WASH Cluster. UNICEF is the lead agency who coordinates the response of the agencies working on ground.

References

Guidelines:

The Sphere Project: Humanitarian Charter and Minimum Standards in Disaster Response 2004.

Transitional Settlement and Reconstruction After Natural Disasters, UN 2009.

Transitional Settlement: Displaced Populations, Corsellis & Vitale, Oxfam Publication 2005.

Key Documents:

Bangladesh National Housing Policy Salient Feature http://www.nha.gov.bd/index.php

Draft National Disaster Management Policy, Government of Bangladesh, January 2008.

Early Recovery Action Plan, Ministry of Food and Disaster Management Bangladesh, February 2008.

Early Recovery Workshop, UNDP, February 2009.

Family Shelter Repair Reconstruction Updates in 12 Sidr Affected Districts *in* Qualitative Assessment of Shelter Construction Situation in SIDR Affected Areas: A Survey Report, DMB,UNDP, December 2008.

Joint Damage, Loss and Needs Assessment (JDLNA) for Recovery and Reconstruction after Cyclone Sidr, Government of Bangladesh, World Bank, European Commission, April 2008.

Lessons Learnt Workshop on Sidr 2007 Emergency and Early Recovery Response. UNDP, DMB 2008.

One year after Cyclone Sidr: fear replaces hope-Oxfam Briefing Note, November 2008.

Sidr Report of Field Investigation of Shelter Conditions and Needs: Shelter Coordination Group- Early Recovery Needs Assessment Shelter Cluster. February 2008.

Super Cyclone Sidr 2007: Impacts and Strategies for Interventions, Ministry of Food and Disaster Management Bangladesh, February 2008.

Internal Documents:

Evaluation of the Disaster Response Programme (Cyclone SIDR), S Ferretti, Action Aid, February 2009.

Cyclone SIDR 2007 BRAC's Rehabilitation Programme funded by Oxfam Novib and Oxfam America: Monitoring of Shelter project, V. Sriraman, Red R India, July 2008.

Post-Sidr Family Shelter Reconstruction, B, Flinn and P, Beresford, DFID, July 2009.

Other Documents:

A Review of the IFRC-led Shelter Coordination Group -Bangladesh Cyclone Sidr Response 2007-2008, S. Davidson, 2008.

Bangladesh: Cyclone Aila victims still in need http://www.irinnews.org/Report.aspx?Reportid=85141

Cyclone Aila tests Oxfam houses in Bangladesh, Oxfam America, May 2009.
http://blogs.oxfamamerica.org/index.php/2009/05/26/cyclone-aila-tests-oxfam-houses-in-bangladesh/

Cyclone Resistance Domestic Construction in Bangladesh, J. Lewis and M.P Chisholm *in* 'Implementing Hazard Resistant Housing',S.M. Seraj and J.R. Choudhury (eds), BUET, DFID, Housing and Hazards, December 1996.

Disasters and the Small Dwelling, Y. Aysan and I. Davis (eds), James and James Science Publishers Ltd. 1992.

House owners can solve key humanitarian challenges in post disaster construction in Bangladesh: Lessons from use and non-use of ODR in participatory environment, K. Alam *in* 'Development From Disaster: Scaling Up Owner Driven Reconstruction Conference', London 2008.

The Daily Star, February 01, 2002 quoting a World Bank report in Rights to Shelter: Bangladesh, R. Nawaz, in 'Adequate and Affordable Housing for All Conference', Toronto, 2004.

Strengthening the Role of Private Sector Housing in Bangladesh Economy: The Policy Challenges, CPD Dialogue Report 64, November 2003.

Wind Resistance of Non-Engineered Housing, A.M.M.T Anwar *in* 'Implementing Hazard Resistant Housing', R.L.P. Hodgson, S.M. Seraj and J.R.Choudhury (eds), BUET, DFID, Housing and Hazards, December1996.

Annex A1: Technical Information Summary

The information compiled in this section is based on the information provided by the participating shelter working group member agencies.

Implementing Agency: ACF

Implementing Partner: Sangram-Barguna

Donor: ECHO, FAM France, ACF

Programme Objective: Enhance the living conditions and provide sustainable shelter for the cyclone affected populaiton.

ramme Location: Barguna Sadar and Amtali in Barguna District

Programme Timeframe: December 2008 - December 2009

No.of houses built: 615, **Cost per house**: 29,000 Taka

No.of house repaired: 300, **Cost per repair:** 16,000 Taka maximum.

Sanitation: 915 latrines with each house , **Cost per latrine:** 3,250 Taka

House Size: 14ftX12ft, 14m sq.

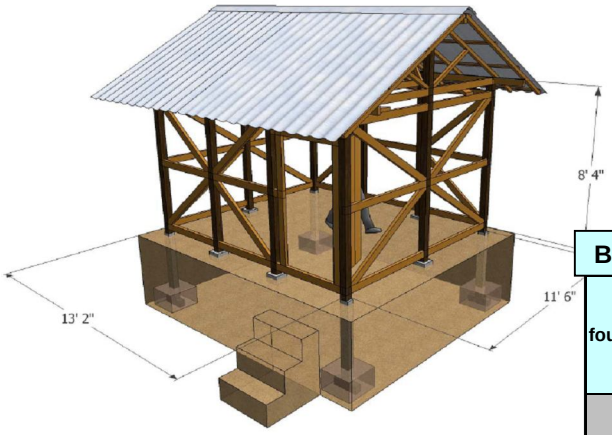
Structure: Timber Frame with Cement Stump with T-footing for foundation.

Roof: Timber framed pitch roof with CI sheet

Designed by: Solidarites and Handicap International architects, modified by ACF architect.

Construction managed by: ACF

DRR Training: construction techniques against high winds and follods to 915hh 70 sessions



Foundation	Concrete Rings (Ø30") T=1,5" h=1' (3# hor.12mms + 4# vert. 12mms)
	Concrete Slab 33' x 33' (sifon+plastic pen) T=2" (12# 8mms)
	Cement bag 50 kg
	River sand

Bill of quantities for a latrine

wooden structure	Bambo Mats 3' x 6'	medium quality
	Bambo Mats 3 'x 6' (door)	medium quality
	Chambul Ara	4'-6'' x 0'-2'' x 2"
	Chambul Rua	4'-6''' x 0-'2'' x 2"
	Chambul Chara	4'-6'' x 0'-2'' x 0'-1" (2 door)
Roof / others	CI sheet 9' - 0.36mm	
	Twisted Nail 2'' (Roof)	
	Steel Door Kobja - 2" (hinges)	
	Perak 4" (Gaza) (90Pcs)	
	Perak 3" Damis (100 Pcs)	
	Perak 2" Damis (170 pcs)	
	Nylon wire	

Bill of quantities for a house

foundations	1	Concrete stump with **STEEL** clamp
	2	Bolt **5"** with 2 washers
	3	Cement bag 50 kg
	4	River sand
	5	Bricks
wooden walls structure	6	Rentry Pillar 8'-4" x 0'-4" x 0'-4"
	7	Rentry Pillar 11'-4" x 0'-4" x 0'-4"
	8	Chambul Chucade 13'-07" x 0'-4" x 0'-2"
	9	Chambul Chucade 16" x 0'-4" x 0'-2"
	10	Chambul Chucade 11'-10" x 0'-4" x 0'-2"
	11	Chambul Ara 11'-10" x 0'-4" x 0'-2"
	12	Chambul Barar Chara 6'-7" x 0'-4" x 0'-2"
	13	Chambul Barar Chara 5'-6" x 0'-4" x 0'-2"
	14	Chambul Kat 4'-0" x 0'-6" x 0'-2"
wooden roof structure	15	Chambul Chal Chara 16'-5" x 0'-2" x 0'-1"
	16	Chambul Rua 8'-6" x 0'- 2" x 0'-2"
	17	Chambul Matudi 16'-5" x 0'- 2½" ' x 0'-2½"
	18	Chambul Angle 4'-4" x 0'-2" x 0'-2"
	19	Chambul Lomba lombee 3'-8" x 0'- 2" x 0'-2"
	20	Chambul Angle 16'-5" x 0'-2" x 0'-1"
	21	Wood preservative treatment product
door	22	Chambul Kat frem 6'-10" x0'-4" x 0'-2"
	23	Chambul Kat 5'-0" x0'-4" x 0'-2"
	24	Steel "write" Door Kobja - 4" (hinges)
	25	Chambul Palla (door) 6'6" x 1',6" x 1.25"
	26	Chambul Chal Chara (door) 21'-0" x 0'-2" x 0'-1"
	27	Chambul Door Clam 6'-6" x 0'-2½" x 0'-1½"
CI sheet roof	28	CI Sheet 8' – 0.36 mm
	29	Top Makta 6' – 0.36 mm
	30	Twisted Nail 2" (For Makta & Roof)
	31	Mouri
Others	32	Perak 4" (Gaza) (90Pcs)
	33	Perak 6" (Gaza) (12 Pcs)
	34	Perak 3" Damis (100 Pcs)
	35	Perak 5" Damis (100 Pcs)
	36	Perak 2½' Damis (170 pcs)
	37	Perak 2" Damis (170 pcs)

Implementing Agency: Action Aid Bangladesh

Partner Agency: JJS-Kulna, Speed Trust-Patuakhali

Donor: DEC, Mariah Foundation, AGIRE, SCP

Shelter Programme Budget: 33,172,116 taka (for 13 months)

Programme Objective: Construction of permanent settlement on Khas land

Programme Location: Kalapara in Patuakhali, Sharonkhola in Bagerhat District

Programme Timeframe: March 2008- July 2010 **Number of houses built:** 140

Cost per house: 2,40,000 Taka

Water: tube well installation, canal and pond excavation. **Cost per latrine:** no fund left

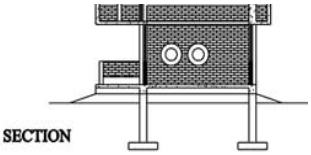
Structure: RCC frame structure with brick wall **Roof:** Reinforced flat roof

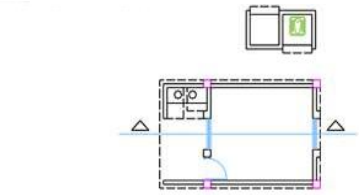
Designed by: Domus Architects, Bangladesh.

Construction Managed by: Five professional construction firms were contracted.

Bill of quantity with specifications for the contractor

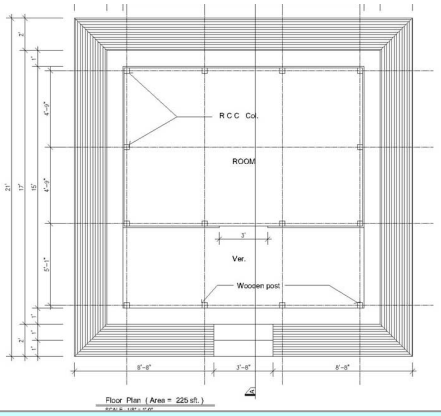
		House
1	Mobilization	L.S
	Erection, maintenance of site office, other accomodations shall be ready for occupation within seven 7 days. The contractor will provide day and night guards. At the end of the project all materials, equipment and plant, furniture,fittings recovered from dismantling the site and removing access road will be the property of the contractor. The site should pose first aid-box, safety helmet, consumables stationaries	
2	EARTH CUTTING	400
	Earth cutting in foundation as per drawing. And site condition, dump near the site all complite asper direction of the E/C	
3	EARTH FILLING	480
	Earth filling in foundation trenches and plinth in 150mm layer with earth available within 90 m of the building site, watering, levelling and consolidating each layer up to finished level etc. all complete as per direction of the E/C.	
4	SAND FILLING	45
	Sand filling in foundation trenches and plinth in 150mm layer with fine local sand having minimum F.M-0.8 in/c. watering, levelling and consolidating each layer up to finished level etc. all complete as per direction of the E/C.	
5	BRICK SOLING	220
	One layer of brick flat soling in foundation or in floor with ist. class or picked jhama bricks in/c. preparation of bed and filling the interstices with local sand, leveling in/c. supply of water, electricity and other charges and cost of tools and plants etc. all complete as per direction of the E/C.	
6	REINFORCEMENT	810
	Supplying, fabrication and fixing to details as per design deformed bar erinforcement in concrete in accordance with BSTI standard in/c. straightening and cleaning rust, if any, bending & binding in position in/c. supply of G.I. wire etc. complete in all respects in all floors as per direction of the E/C..	
7	RCC WORK	300
	Reinforced cement concrete works (1;2;4) of specified compresive strength f'c 32 Mpa at 28 days on standared cylinder, with cement conforming to BDS 232 & ASTM standard, using wooden shutter, best quality coarse sand (F.M-2.5) 20 mm down well graded crushed stone chips in/c.breaking chips and screening through proper sieves, making, placing in position the centering shuttering, wood and bamboo etc. concrete mixing with mixer machine, casting in forms, compacting by vibrator machine and curing at least for 28 days, removing centering shuttering, all complete in/c. cost of water, electricity, testing of materials and concrete & other charges as per direction of Engr.-in-charge. (Rate is excluding the cost of reinforcement and its fabrication).	
8	5" BRICK WORKS	310
	125 mm brick work with 1st. class bricks in cement sand (F.M. 1.2) morter (1:4) in foundation or in superstructure, filling the joints fully with morter racking out joints, cleaning and soaking the bricks at least 24 hours before use and curing at least for 7 days etc. all complete as per direction of the E/C.	
9	5" BRICK POINTING	310
	pointing in 125 mm brick work with cement sand (F.M. 1.2) morter (1:4) in outsite joints,curing all complete as per direction of the E/C.	
10	10" BRICK WORKS	100
	250 mm brick work with 1st. class bricks in cement sand (F.M. 1.2) morter (1:4) in foundation or in superstructure, filling the joints fully with morter out joints, cleaning and soaking the bricks at least 24 hours before use and curing at least for 7 days etc. all complete as per direction of the E/C.	
11	PLASTER WORKS	310
	Plaster works at inside wall with cement, sand mortar (1:5) (F.M. 1.2) screening, mixing, curing for at least for 7days in/c the supply of water, electricity and other charges and cost of tools and plants etc. all complete as per direction of the E/C	
11	1/2 " PLASTER WITH NET CEMENT FINISHING.	165
	In floor plaster with NCF with cement, sand morter (F.M. 1.2) . screening, mixing, laying, compacting to levels and curing for at least for 7 days in/c. the supply of water, electricity and other charges and costs of tools and plants etc. all complete as per direction of the E/C.	
12	DOOR (design shown at sheet D01)	1
	Supplying, fabrication and fixing to details as per design	
13	WINDOW (design shown at D02)	3
	Supplying, fabrication and fixing to details as per design	
14	CAT DOOR (design shown at D02)	1
	Supplying, fabrication and fixing to details as per design	
15	WATER COLLECTION DRUM & FITTING (design shown at A04)	2
	Supplying, fabrication and fixing to details as per design with connection pipe.	
16	2" @ M.S PIPE FITTING [2'-0"] (design shown at A04)	4
	Supplying, fabrication and fixing to details as per design	
17	ELECTRICAL PIPE & BOX FITTING (design shown at E01)	1
	Supplying, fabrication and fixing to details as per design	

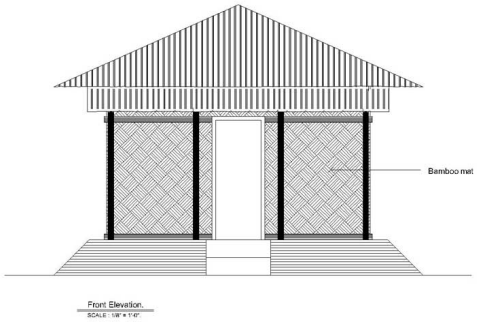




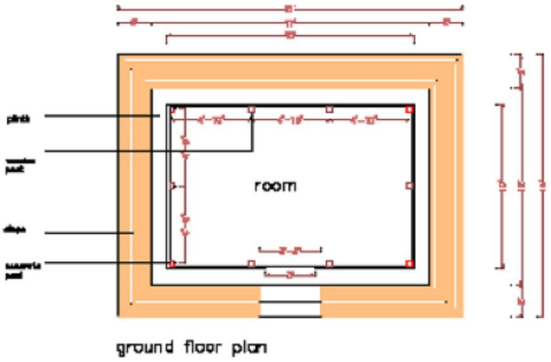
PLAN AT LEVEL 5'-0"

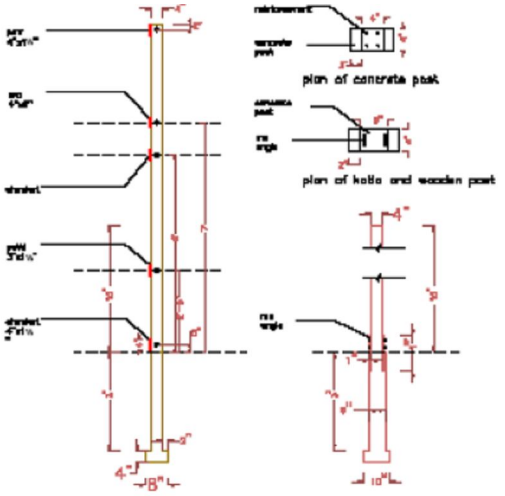
Implementing Agency: BRAC
Donor: DFID, Oxfam Novib
Programme Objective: Transitional core shelter assistance to the most vulnerable families
Shelter Programme Budget: 7,80,00,000 Taka
Programme Location: Bagerhat, Pirojpur, Patuakhali, Barguna, Jhalokathi Districts.
Programme Timeframe: Mid 2008- Early 2009
Number of houses built: 1302
Cost per house: 47,000 Taka
House Size: 15ftX10ft
Structure: T-footing cement pillar with timber posts and frame.
Roof: Timber framed Hip Roof with CIsheet
Designed by: Architecture department BRAC University, Engineering Dept, BRAC.
Construction Managed by: BRAC field staff

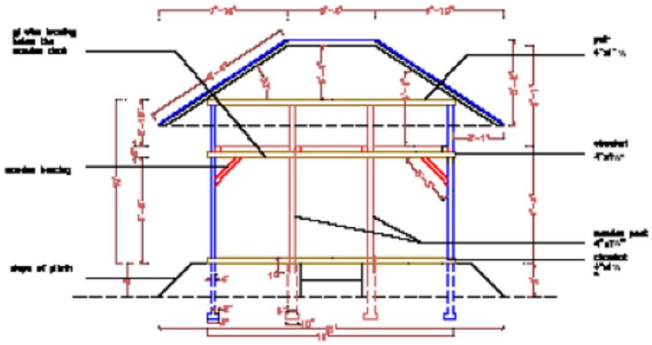


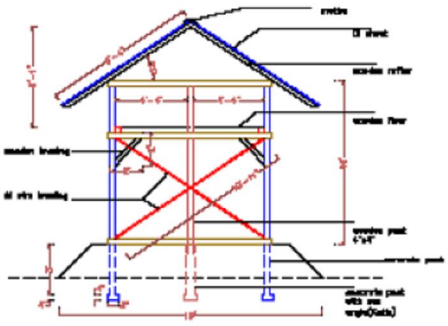


Initial design (plan below) was without veranda. The final design (drawings above) was modified to add a veranda

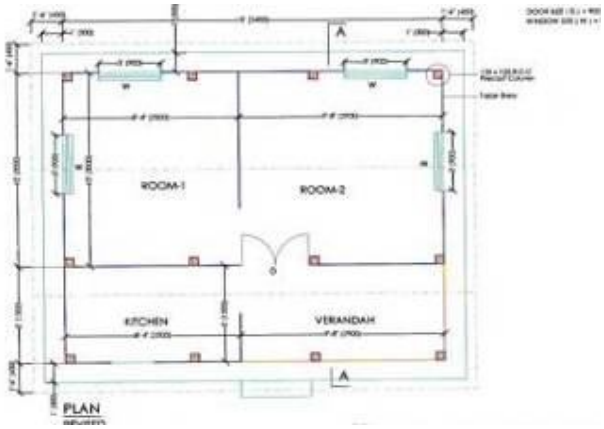


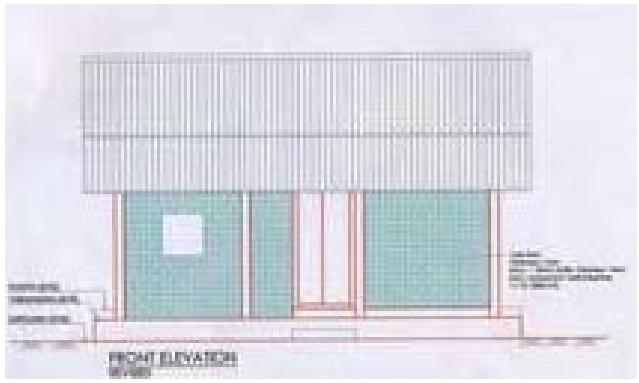


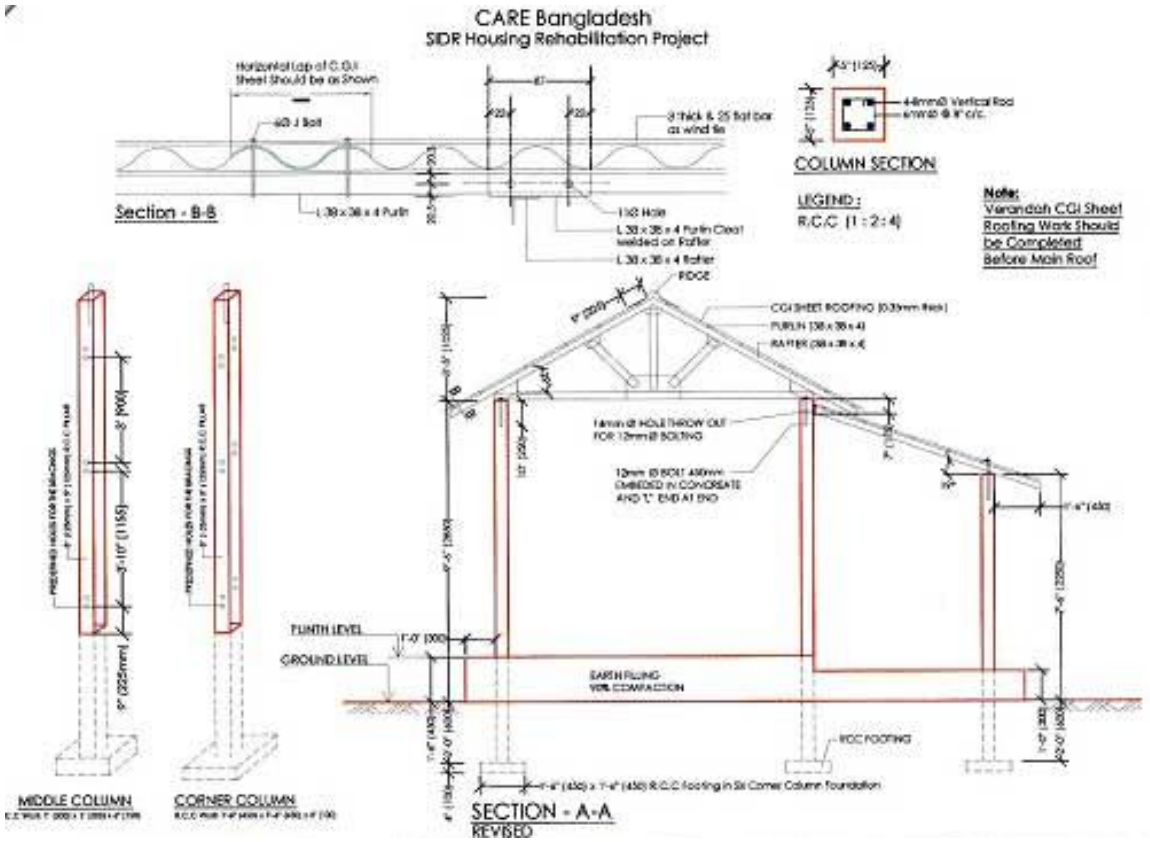




Implementing Agency: CARE Bangladesh
Donor: DEC, USAID
Shelter Budget: 130 million taka (for 9 months)
Programme Objective: Housing rehabilitation for the most vulnerable families
Programme Location: Kalapara in Patuakhali, Sharonkhola in Bagerhat District
Programme Timeframe: March 2008- November 2008
Number of houses built: 1,223 **Cost per house:** 105,000 Taka (1500 USD)
Cost per latrine: 40 USD
Water: Rain water storage tank (250USD) with each household, for communal water source- pond cleaning, pond sand filter and hand tube wells.
House Size: 10ftX 18ft (with two rooms) and 5ft long veranda
Structure: Cement pillars with footing and timer post and frame structure with ? wall
Roof: steel truss with CI sheet
Designed by: CARE
Construction Managed by: CARE







Post-Cyclone Sidr Family Shelter Construction in Bangladesh

Documentation of Plans and Processes

Implementing Agency: Concern Worldwide Bangladesh

Partner Agency: Sangram-Barguna

Donor: DEC, ECHO, Irish Aid, CESVI, GLANbia and general donation

Shelter Budget: 2,559,624Euro (for 6 months)

Programme Objective: Transitional shelter assistance to the most vulnerable families

Programme Location: 4 Upazilas in Patuakhali, 5 Upazilas in Barguna District.

Programme Timeframe: Dec 2007- June 2008

Number of houses built: 6,800 house in three phases (2000,3500,900)

Cost per house: 28,942taka(292Euro), 27,058 taka (273Euro), 36,647 taka (359GBP)

Cost per latrine: 2,717taka

House Size: 15ftX11ft3inch(168.75sft)-Phase 1,
13.5ftX 9.75ft (131.62sft)- Phase 2,
17ftX 11.5ft (195sft)- Phase 3 (see drawings),

Structure: RCC pillars with footing and timber post with bamboo mat wall,

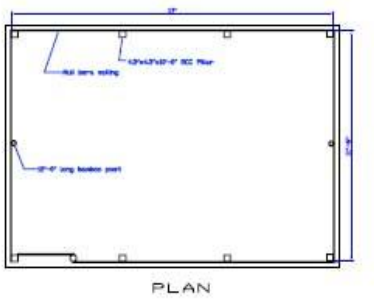
Roof: steel truss with CI sheet

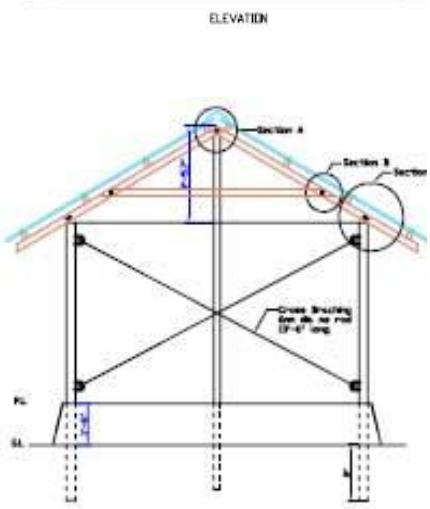
Designed by: Concern,

Construction managed by: local contractors

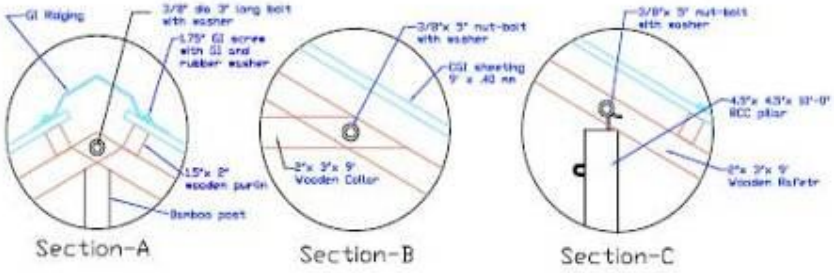
	Full House Construction (17'-0" x 11'-6") *Floor Area 195.5 sqft*			
sl	**Description**	**Size**	**Unit**	**Quantity**
1	Rcc Pillar	10'-0" long	nos	8
2	Borak Bamboo post	13'-0" long	nos	2
3	Borak Bamboo post	9'-6"	nos	1
4	Muli bera walling	full set	sft	352.63
5	Velki bera	2 pce	sft	39.33
6	Bera door	3'-0"x6'-3"	piece	1
7	Wooden Rafter	3"x2"x8' - 9 pcs (4x2)	cft	3.00
8	Wooden Collar	3"x2"x8' -4 pcs	cft	1.50
9	Wooden purlin	2"x1.5"x11'-0" - 16pcs	cft	3.67
10	CGI sheeting	9'-0" long & .40 mm thick	piece	18
11	GI ridging- 6'-0" long	.35 Thick	piece	4
12	Cross bracing	13'-6" 8mm rod	piece	4
13	Hardware materials			L/S
14	House erection labour cost			L/S
15	Plinth preparation			L/S

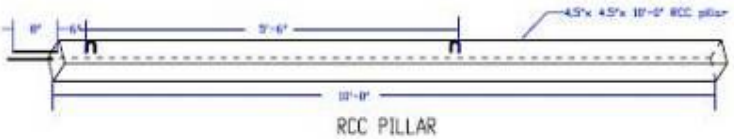
	Latrine			
	Description	**Size**	**Unit**	**Quantity**
	Rcc Ring	2'-6" dia	nos	5
	Squatting Slab	Standard	nos	1
	Borak Bamboo post	8'-6"	nos	4
	Bamboo frame	5'-6"	nos	5
	Muli bera walling	5'-3" X 3'-0"	pcs	3
	Bera door	1 pce	pcs	1
	Bera roof	4'-6"x4'-6"	piece	1

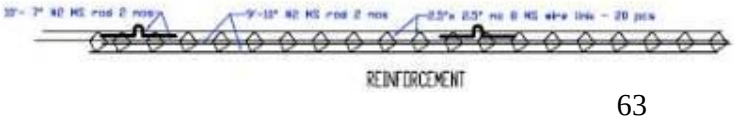




DETAILS OF DIFFERENT SECTIONS





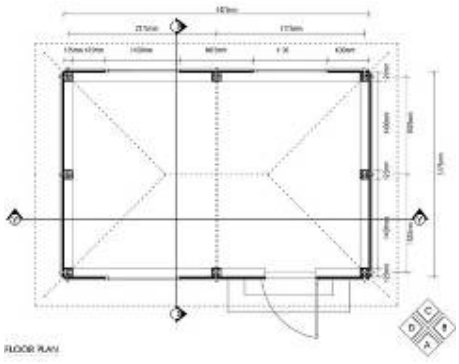


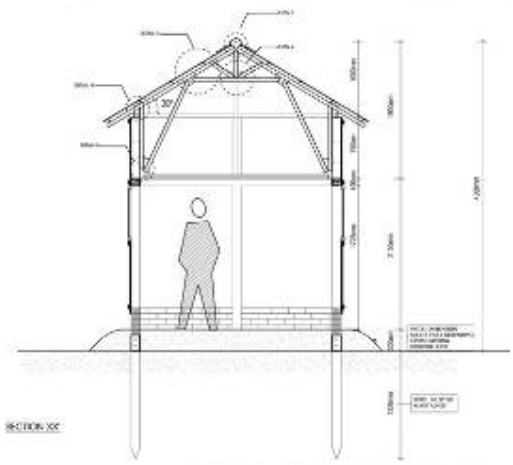
Implementing Agency: CRS and Caritas
Programme Objective: helping rebuild transitional shelters for the Cyclone Sidr affected population.
Programme Timeframe: Completed in February 2008
Number of houses built: 7,300 cyclone-resistant shelters, including 2,500 shelters constructed in partnership with CRS with OFDA-funding
Sanitation: Each household gets a latrine
House Size: Covered space of 18'-0" x 10'-0" with internal partition and a 6-'0"-wide covered veranda extended along one of the long sides of the shelter, giving a total covered area of 288 square feet.
Structure: **RCC pillars with bamboo posts and timber beams**
Roof: **Timber frame with CI sheet**
Designed by: CRS, Caritas

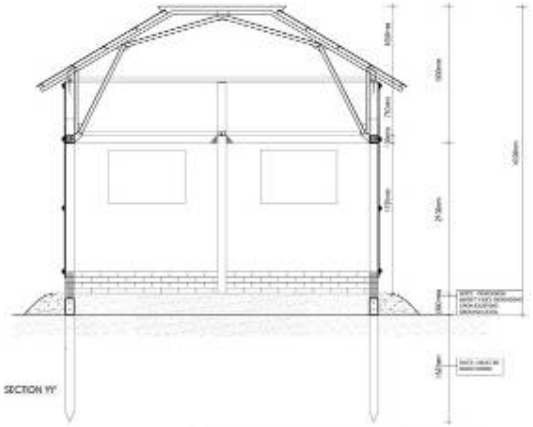
Implementing Agency: BDRCS (Bangladesh Red Crescent Society)
Partner Agency: IFRC (International Federation of Red Cross and Red Crescent Societies)
Donor: More than 60 different donors
Shelter Budget: 315,994,870 taka (for 18months) 177,573,800 taka (Direct cost)
Programme Objective: Sidr Recovery programme is an integrated approach to support targeted communities with shelter, water sanitation, livelihood, health, PSP and DRR components.
Shelter programme objective is twofold:

i. Reconstruct fully damaged houses-1250 Core Shelters
ii. Help **5,093** families to repair and extend their houses with,
    - Cash grant (5,000 or 10,000 taka /family, depending on level of damages)
    - Toolkit (2000taka/family)
    - Training (50 taka/person).

Programme Location: 6 upazilas in Bagerhat, Pirojpur, Patuakhali and Barguna Districts.
Programme Timeframe: November 2008-September 2009
Number of houses built: 1250 core shelters buit, and extended by beneficiaries, 3,843 repaired/extended
Cost per house: 110,000 taka
Sanitation: Each household gets a pit latrine
Water: One water point for approx. 200 people within 500 meters, as per SPHERE standard. Pond sand filters, boreholes are chosen case-by-case basis.
Hygiene Promotion: Dissemination of personal and community hygiene messages to communities and PHAST training.
Structure: RCC pillars and grade beam, 6 layers brick wall with bracing/roofing steel truss. Wood beams for support of eventual mezzanine. Bamboo fencing. **Roof:** Bracing and roofing steel truss with CGI sheets. Truss design to allow maximum living space for eventual Mezzanine use.
Designed by: BDRCS/IFRC and MDM Architects, Bangladesh.
Construction Managed by: Professional construction firms.
DRR training: 5,093households receive 'Safe Shelter Awareness – Repairing Training'.

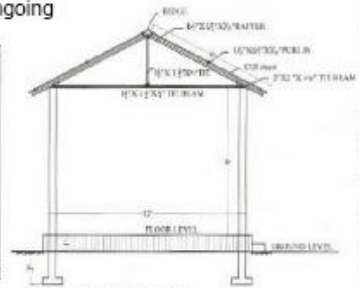


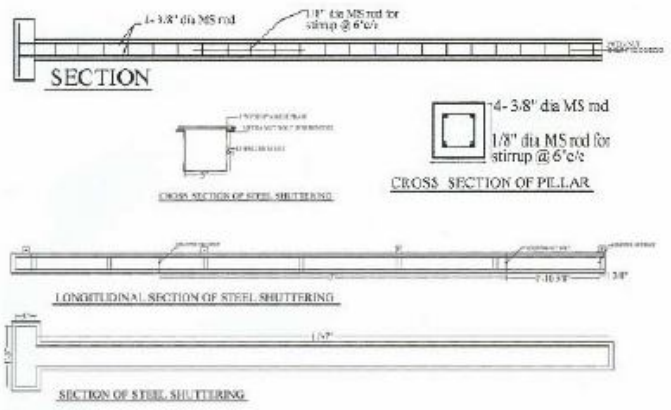


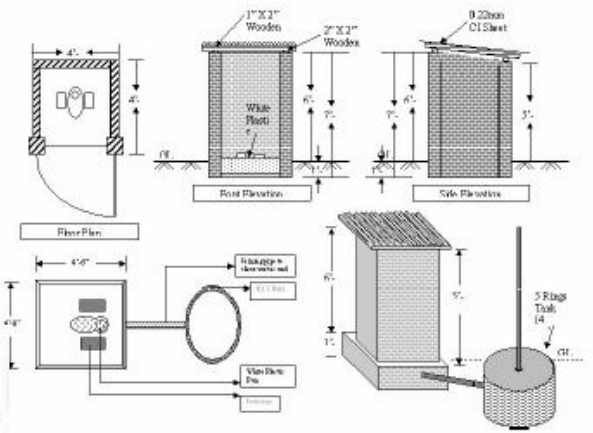


Implementing Agency: Habitat for Humanity International (HFHI)
Partner Agency: SDA,
Donor: Christian Aid Ministries (CAM), Chevron, HFHI-GB, HFHI-N,UNICEF
Shelter Budget: 4,66,11,316 taka (for 10 months)
Programme Objective: Provide a durable, low cost cyclone resistant core shelter to the most vulnerable families.
Programme Location: Mirza ganj in Patuakhali, Bakerganj in Barisal District.
Programme Timeframe: March 2003- December 2008
Number of houses built: 480 houses with latrines**Cost per house:** 48,669 taka (715 USD)
Cost per latrine: 7,909 taka (115USD)
House Size: 18ftX12ft
Structure: Cement pillars with T-footing and timber post and frame structure with CI sheet wall
Roof: steel truss with CI sheet
Designed, materials prefabrication and Construction managed by: Habitat for Humanity
DRR training: 500 people trained in 11 sessions on 'Cyclone and Storm Surge: Our Initiatives' involving the Union Disaster Management Committee (UDMC).
Hygiene promotion training: ongoing


PLAN


SECTIONAL ELEVATION





Brick Wall type	Traditional Brick	380
	Morter (Cement/Sand)	1
Roof	Timber 2"x1"x8' (Chamble tree)	8
	CGI Sheet (1.2x2.4m) .28mm	2
Floor	Concrete slab/path	1
Septic system	Pre-cast concrete rings (.45x90m)	5
Gutter water collection	PVC 4" diam.x6'	1
	Nails/screws (1' length) weight) in kg.	1

Sl	Description of Item	Unit/ Qty.	Required Qty/House
1	Cement	Bag	2.30
M.S. Deformed Rod:			
1	8mm dia Rod	Kg	41.00
2	6mm dia Rod	Kg	20.00
M.S. Angle:			
3	1½" X 1½ X3/16"	Kg	165.00
4	2" X 2"X3/16"	Kg	40.00
1	1st Class Brick (Jamma)	Nos	155.00
2	Sand (Sylhet & Medium):		
3	Sylhet	Cft	4.00
4	Medium	Cft	4.00
1	C.I. Sheet (0.36mm) 8'-0"	Bundle	2.00
2	CI Sheets (0.18mm) 8'-0"	Bundle	4.00
3	Ridge (0.30mm) 6'-0"	Pces	4.00
1	P. V. C Pipe	Rft	12.00
2	Paint	Ltr	1.00
3	Thinner	Ltr	0.50
4	Tar (Alkatra)	Kg	3.00
5	Brash	Pces	0.50
6	Sand Paper	Pces	2.00
1	Wealding Rod	Pck	0.32
2	Cutting Shan (14"x 3mm)	Pces	0.35
3	Grainding Shan (7"X3mm)	Pces	0.35
1	Wood	cft	8.00
Nutt & Bolts:			
1	8" - 10mm dia	Kg	1.40
2	8" - 8mm dia (with 2 big washer)	Kg	4.00
3	1" - 6mm dia	Kg	0.50
GI Wire:			
4	24 # G.I. Wire	Kg	0.71
5	18 # G.I. Wire	Kg	0.60
6	10 # G.I. Wire	Kg	5.00
7	Plain Sheet (5"X8'-0"X3mm)	Kg	2.60
8	J- Hook for Roof	Kg	3.50
Washer:			
9	Washer(Steel)	Pces	140.00
10	Washer(rubber)	Pces	140.00
Nails:			
11	2.5" Nails	Kg	2.00
12	2" Nails	Kg	1.50
13	1" Nails	Kg	0.70
14	Nails washer	kg	0.70
Cobja:			
15	2" Cobja	Pces	8.00
16	3" Cobja	Pces	4.00
Chitkini:			
17	4" Chitkini	Pces	4.00
18	6" Chitkini	Pces	1.00
19	Coyra	Pear	1.00

Implementing Agency: Muslim Aid

Donor: Muslim Aid Headquarters and Channel S London (Core Shelter), ECHO and Individual donation from UK (Transitional Shelter, Sanitary Latrine)

Programme Budget: 242,106,810 taka

Numbers of houses, latrines built/repaired:

- Transitional Shelter (1800) and Core Shelter (1000) Construction
- Shelter Repair (3,650)
- WASH: Latrine Construction (1,845) and Repair (1000)

Programme Location: Sharankhola and Rampal upazillas of Bagerhat district, Mirzagonj upazilla of Patuakhali district, Bhandaria, Nazirpur and Zia Nagar upazillas of Pirojpur district.

Programme Timeframe: Transitional shelter and repair, latrine construction and repair were carried out in three different phases from April 2008 to December 2009, each taking five to eleven months. Core Shelter and Latrine construction time: May 2008- June 2009.

Cost and size per house:

- Core Shelter: 1,00,000 taka. Size: 20ftX 10ft =200 sq. ft. /two rooms + 120 sq.ft. veranda = 320 sq. ft,
- Transitional Shelter:

  Type 1: 40,000 taka (20 ft. x 10 ft. (one room) = 200 sq. ft.

  Type 2: 24,921 taka (14ftX 8ft= 112 sq. ft one room), Repair 14,416 Taka (14pieces of CGI sheet distribution)

  Type 3: Transitional Shelter 27,541 Taka (16 ft. x 10 ft. = 160 sq.ft. one room), Repair 13,632 Taka (CGI sheet 0.36mm and 8ft height, cash grant for pole, carpenter, nails and others)

Cost per Latrine:

- Type 1: 4,106 taka (5 rings, 1 slab produced at own production centers by the trained masons where NGO Forum engineers conducted regular monitoring. Wooden pole and wall, CI sheet door and roof.)
- Type 2: Construction: 2037 taka (5 rings, 1 slab, CI Sheet wall, Wooden structure)
- Repair: 560 taka

Structure and Roof:

- Core Shelter: Brick Masonry Structure with scope for further extension, CI sheet with timber roof truss
- Transitional Shelters: Two types, one with timber frame structure, the other with RCC pillar and timber pole with raised plinth considering 2004 flood level, CI sheet with timber roof truss.

Designed by: Muslim Aid with donor and implementing partners through community consultation. For Core Shelter additional International Consultant was recruited.

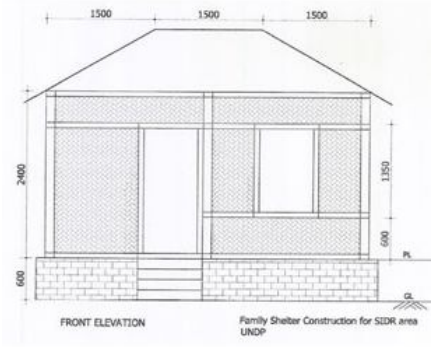
Construction managed by: Muslim Aid field offices with beneficiary groups through group orientation on community based implementation and monitoring. House owners contributed their time and labour to build their own houses as well as their neighbours. All expenses shared and recorded to beneficiary houses as well as to MA site offices.

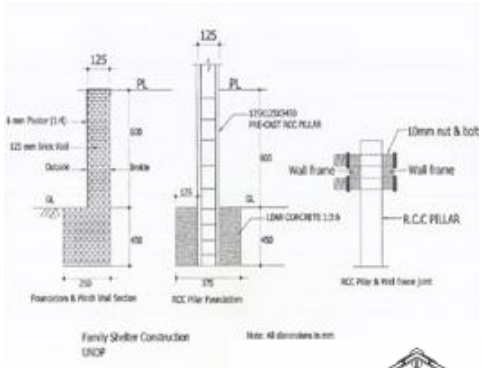
Training: Water, Sanitation, health, hygiene, gender and social awareness

900 Transitional Shelter Phase-2	No.
Corner RCC Pole- 12 feet	4
Wooden pole (Ridge support)-10 ft. 6 in.	2
Middle wooden pole (middle) - 8 feet	4
Anchor (Kajla) Length - 5 feet	6
Wooden Bracing (16'-6")	1
Wooden Bracing (16'-0")	5
Wooden Tie beam (10'-0")	4
Door threshold- Long (6'-7")	4
Door threshold -short (3'-6")	4
Window threshold – long (3'-0")	8
Window threshold - short (2'-0")	8
Door panel (6'-0" X 3'-0")	2
Door panel- Z Batta- chera (3'-0")	12
Door Panel Z Batta- chera (3'-0")	8
Window panel (3'-0"X 2'-0")	4
Window panel- Z Batta- chera (2'-0)	16
Window panel- Z Batta- chera (3'-0")	8
Top rafter (Roof)- 19'-0"	1
Roof rafter (7'-9")	14
Roof purlin (18'-6")	6
Truss (2'-9")	9
Normal CGI sheet for roof (0.36 mm and 8ft height)	16
Normal CGI sheet for walls (0. 20 mm and 7ft height)	24
CGI Ridge	4
Nails, spikes & GI wire	1
Carpenter cost	4

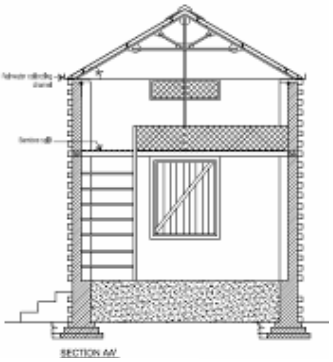
Core Shelter-Estimate Description of Items	Unit	Qnty
Earth cutting work	cft	225
Earth filling	cft	50
Sand filling	cft	315
Brick flat soling	sft	455
Polyethylene sheet/vapor barrier	sft	470
DPC	sft	26
RCC Works	cft	14
M.S Rod (40 Grade-Deformed)	kgs	55
Brick work (10" thick)	sft	291
Brick work: (5" thick)	sft	480
Cement plaster on brick work	sft	1025
Cement plaster with N.C.F.	sft	620
Steel shutter door	sft	42
Wooden window	sft	72
White wash	sft	1100
Enamel paint	sft	84
C.G. I. sheet roofing	sft	427

Implementing Agency: UNDP
Partner Agency: Phase 1: 13 UN Pre-qualified Partner NGOs, Phase 2: International Procurement and Contract selection process was applied, where four local NGOs were qualified as contractors (international construction regulation and building process).
Donor: Phase 1**:** DFID, Phase 2: DFID and UN
Shelter Budget: 10.5million USD, 8 million USD
Programme Objective: to reduce the vulnerability of the cyclone Sidr affected families through re-construction of their Core Family Shelters
(25015 families with eight partners, house repaired in 12 districts in the emergency phase)
Programme Location: 12 sub-districts of 6 worst affected districts
Programme Timeframe: Phase 1: April 2008-October 2008, Phase 2: October 2009-February 2010
Number of houses built: Phase 1: 9,145, Phase 2: targeted 6000+ shelters
Cost per house: Phase 1: 72,000 Taka, Phase 2: 100,000 Taka
Water - Sanitation: None
House Size: 3250mX4750m (10ftX15ft) 150sft, Phase 2: 150+75 mezzanine floor=225sft
Structure: Phase 1: concrete pillar with bamboo mat wall and wooden truss, Phase2; reinforced brick masonry with wooden mezzanine floor and Metal roof truss.
Designed by: Phase 1: UNDP consultant, Phase 2: UNDP Staff
Construction Managed by: 13 UN Pre-qualified Partner NGOs some of which hired local contractors. 4 contracted NGOs and Monitored by Civil work supervision consultant.

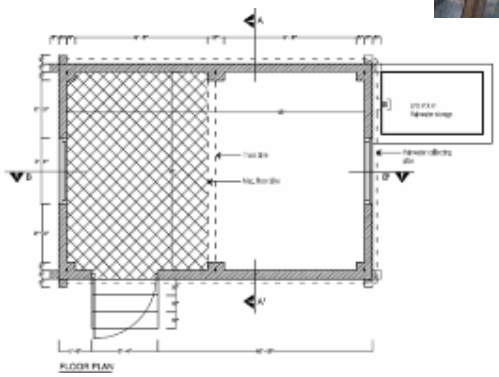


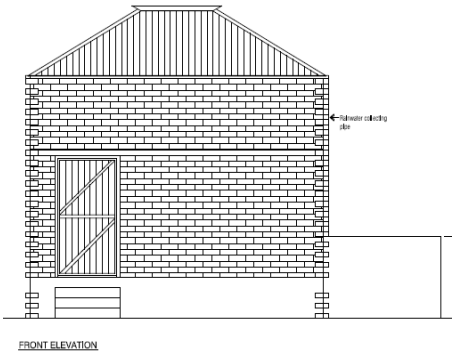


Phase 1: Elevation and Details (top)

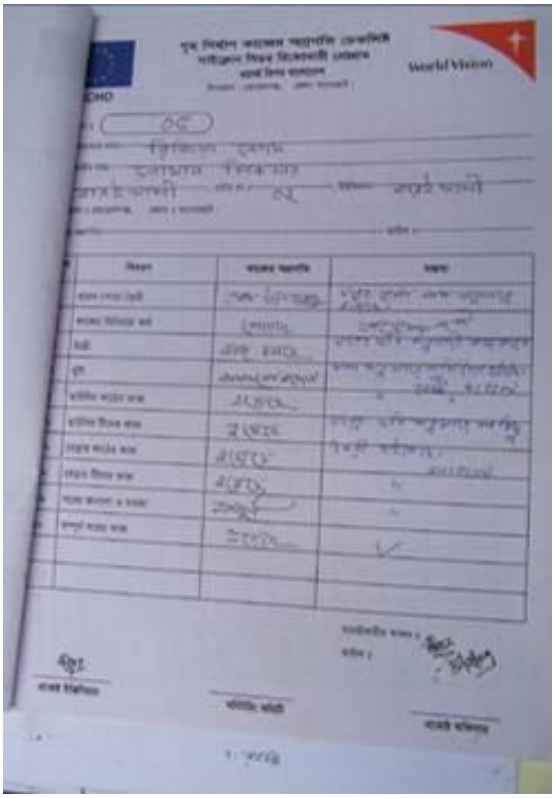


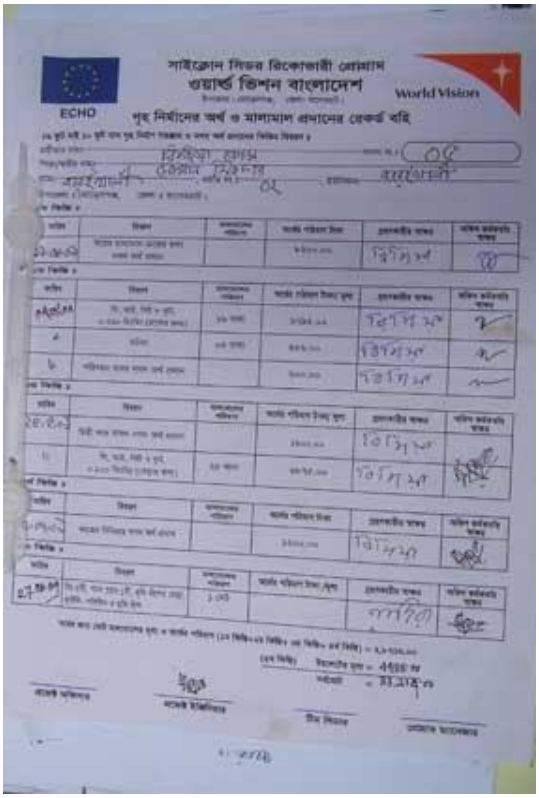
Phase 2: Plan, Section, elevation and photograph of the mezzanine floor.





Implementing Agency: World Vision
Donor: ECHO
Shelter Programme Budget: 56,084,375 taka for nine months
Programme Objective: Construction of low cost shelter
Programme Location: Pirojpur in Bhandaria, Morelganj in Bagerhat District
Programme Timeframe: March 2009- October 2009
Number of houses built: 1534 (1304 full house & 230 partial houses with toilet facilities for every house owner.)
Cost per house: Tk.33200 (For toilet and a full house)
Sanitation: None (due to lack of fund).
Water: tube well installation, canal and pond excavation.
House Size: 16ftx10ft
Structure: timber frame structure with pitch roof
Designed by: carpenters with given instruction on house size and roof from
Construction Managed by: House owners
Phase 1: Tk.1200 through CFW for raise the plinth level
Phase 2: Tk. 8200 for procuring materials for building a house structure
Phase 3 : Tk. 1600 for mason and house owner to build the house themselves.
Procurement:
Phase 1: World Vision Procured CI Sheet
C.I Sheet 16 nos. 0.36mm thick for roof.
C.I Sheet 25 nos. 0.19mm thick for fence
C.I Ridge 0.36mm thick
Phase 2: House owner purchase the housing materials like Wood, Nail, G.I wire out of Tk 8200.





Annex A2: List of Informants

Institution	Informants	Designation	Location	Information
Government of Bangladesh-Saudi Government	Shahin Ahmed Chowdhury	Director, Engineering Division, DRR, DMB	Dhaka	Interview
	Md. Abdul Mazed	Executive Engineer DRR,	Dhaka	Interview
	Eng Abu Sadeq	Previous Co-chair SCG and Director DMB.	Dhaka	Interview
ACF	Bishwojit Kuma Roy F. J. Curras Pardes Ziaur Rahman,	Programme Manager Risk Reduction Shelter Manager Shelter Quality Control Officer	Barguna	Interview, Field Visit Discussion Questionnaire
Action Aid	Sajid Raihan, Wahida Bashar Ahmed	Manager- Risk Reduction Manager & Theme Leader	Dhaka	Interview Questionnaire
BRAC	A.I.M Monsoor, Ashutosh Alamgir Hussain	Chief Engineer Regional Manager Disaster Management	Dhaka	Questionnaire Discussion
BDRCS	Afsar Uddin Siddique	Shelter Coordinator	Barisal	Meeting, Field Visit Documents (including Spanish and British Red Cross)
CARE	M.A. Wahed Labonno Bishwash	Emergency Response Preparedness Coordinator, Infrastructure Officer	Dhaka, Morelganj	Questionnaire Field Visit
Caritas-CRS	Snigdha Chkraborty Robert Amar Costa	Country Manager	Morelganj	Field Visit Documents
Concern	Mizanur Rahman	Technical Specialist	Mijaganj	Field Visit Questionnaire
DFID (Donor)	Bill Flinn	Shelter Consultant	UK	Documents, Telephone Discussion
Habitat for Humanity	Abul Bashar Jashoda Binoy Chakma	Project Manager Former Employee	 Mirjaganj	Questionnaire Documents
Housing and Hazards Group	Robert Hodgson	Coordinator (Bangladesh and UK Research Link)	UK	Discussion Documents
IFRC	Xavier Genot Md. Mahbub Alam, Hasibul Bari	Shelter Delegate Construction Officer Construction Officer	Barisal	Questionnaire, Discussion, Field Visit
Muslim Aid	Md Obaidur Rahman Bikash Sarkar	Head of Emergency Response Project Manager Shelter-Watsan	Mirjaganj	Documents, Telephone discussion
Oxfam America (Donor)	Kenny Rae	Emergency Advisor	Email Dhaka	Documents Discussions
Red R India	V. Sriraman	Evaluation Consultant for Oxfam	Dhaka	Same as above
Sangram (Partner)	Md Yousuf Md Al Amin	Deputy Director Shelter Programme Coordinator	Barguna	Telephone Interview Field Visit
SDA (Partner)	K M Enayet Hossain Chanchan Rakhain Onimesh Raj Moazzem Hossain	Executive Director Programme Coordinator Programme Officer Extension Officer	Mirjaganj	Field Visit Discussion
UNDP	B MM Mozharul Huq Shamira Haider Amar Chandra Kar Steven Goldfinch Shashanka Saadi Md Shakeel Khan Tariqul Islam Taraqul Bhuya Jane, Asma, Uttam	SWG Coordinator, Disaster Response Advisor Shelter Specialist Economic Recovery Specialist Programme Officer Programme Manager Research Officer Information Officer Engineer Administration	Dhaka Field	Discussion, Documents, Questionnaire, Field Visit, Publication and Logistics support.
World Vision	Rupan Kumar Chakma Md. Mizanur Rahman Ranjit Bishwash	Engineering Specialist Project Engineer-Shelter Community Facilitator	Dhaka Morelganj	Discussion, Questionnaire Documents, Field Visit

Annex A3: Implementing Agency Information Collection Sheet

Introduction:

This questionnaire is aimed to document the shelter response experience of major contributing agencies involved in family shelter reconstruction projects after Cyclone Sidr 2007.

Aim of this documentation is to assess the structural soundness, disaster risk reduction measures and cultural suitability of the houses built. This is not a critical evaluation but a learning and information sharing exercise for the Shelter Working Group Members and other contributing agencies on what types of shelters were constructed Post Cyclone Sidr. The information provided by the shelter implementing agencies will then be compiled as a publication to be used as a resource for improving future family shelter programme in Bangladesh.

Section 1: General Information and Programme Overview

1. Implementing Agency Name:

2. Implementing Agency focal point name, email and mobile number:
   I. How long have you been working in the Sidr Recovery Programme?
   II. Have you worked in the affected area before?

3. Implementing partner agency names and their focal point contacts' mobile and email:
   I. How long have you been working in the Sidr Recovery programme?
   II. Have you worked in the affected area before?

4. What other Sidr Recovery Programme Interventions did your agency undertake apart from the Shelter Programme?

5. Total Number of Families Assisted by Sidr recovery Programme (Shelter, Livelihoods, Micro Finance, Health, Education, Health, Disaster Risk Reduction etc)?

6. How much was the Total Budget and the budget for Shelter?

Type	Project Duration	Budget in TK	Donors
Shelter Budget			
Total Sidr Budget			

7. Total number of families assisted by the shelter programme. Provide breakdown by district and village names:

District	UP, Village	Number of families receiving shelter assistance by type and phase					
		Emergency	Transitional		Permanent		
		Shelter materials, tools distribution	Shelter Repair	Transitional-Shelter	Permanent-Shelter	Cash or Loan	Other
Bagerhat							
Pirojpur							
Patuakhali							
Barguna							
Khulna							
Madaripur							
Shariatpur							

Barisal							
Bhola							
Satkhira							
Jhalakathi							
Gopalganj							

Section 2: Shelter Programme Specific Information

8. Total number of family shelters built or the number of households receiving shelter assistance from emergency phase to reconstruction phase (please write below if additional space needed).

Phases	**Emergency**		**Transitional**		**Permanent**			
Types of Shelter Assistance	**Shelter Cash Grant**	**Emergency Relief Material Distribution - First 6months**	**Transitional Shelter (3months-till now)**	**Shelter Repair**	**Shelter Reconstruction**	**Training on house improvement or risk reduction**	**Loan or Micro-credit for house building or repair**	**Other**
Example/ Description of assistance	Money given to the families to build houses	Tarpaulin, CGI sheet, nails, ropes, tools (hammer, axe, nails etc)	CGI sheet, bamboo, timber poles, (roofing framing materials and tools)					
Describe								
i. Programme Time Frame								
ii. When did it start								
iii. When did it finish								
iv. When is it expected to finish								
v. Numbers of families assisted								
vi. Contribution from each families								
vii. Cost per Family								

9. Provide the design/detail drawings and photographs of the family shelters built. (Electronic copies are preferable).

10. How did you decide on the house size and design?

11. Have you heard about SPHERE Minimum Standards in Emergencies? If yes, how and what way did you follow this standard for the shelter design?

12. Have you attended shelter coordination meetings in your areas? Have you heard about the shelter standards recommended by the Shelter Coordination Group?

    i. If yes, how did you use it for your shelter programme design?

    ii. If no, how did you coordinate with other implementing agencies?

13. Provide Bill of Quantities (BOQs) of individual shelters (Electronic copies are preferable). With Cost per family.

    i. Any difference between estimated cost and actual cost?

    ii. If Yes, why?

14. What contribution did the families have in their shelter construction? Free labor/Additional money/ others?

15. List of shelter materials distributed to individual families (Electronic copies are preferable).

16. Design Process: Who designed the shelters or the shelter programme and how long did it take to get the final design and programme approval to start the project including staff recruitment and programme funding:
    Below are some examples:
    i. International Head Quarter-
    ii. Head office in Dhaka -
    iii. Field Office-
    iv. House Owners-
    v. Local Builders/mistirs-
    vi. Contractors-
    vii. Others, describe if others

17. Design Time: How long did it take to finalize the design, drawings and the cost?

18. Did any one approve the design? If yes who?

    i. Technical Expert within the Agency (National/International)

    ii. External consultant (National/International)

19. How long did it take to start the construction work after the design was finalized?

20. How many staff was recruited to implement the project in each field office/programme area and how long did it take to recruit them?

21. Draw an organizational diagramme/ organogram, with detail of the shelter team staff + numbers of additional construction team per house/per village).

22. What were the major problems or challenges during of the shelter programme you undertook? (Rank the top five problems according to its priorities).

    i. Lack of clear reconstruction policy or design guidelines from the government or the Shelter Working Group
    ii. Lack of expertise were available (engineers, builders) to design the shelter project
    iii. Lack of knowledge or technical information available on how to make a cyclone resistant core house.
    iv. Lack of staff to implement the project
    v. Lack of local NGOs to partner with
    vi. Lack of contractors to implement the project
    vii. Lack of money to for a shelter reconstruction Programme
    viii. Lack of materials available locally
    ix. Cost of materials increasing after the cyclone
    x. Difficulty to bring materials to the field
    xi. Quality of the material
    xii. Approval from the head office to start the Programme
    xiii. Not enough funds to build houses with water-sanitation
    xiv. Houses were not cyclone resistant and it was damaged again
    xv. Corruption and favoritism at all level
    xvi. Unable to work for the landless
    xvii. Unable to work in the char islands
    xviii. Others (Please explain)

23. If you were do shelter programming for another disaster response in future, what improvements will you make? What are your lessons learnt from this reconstruction experience?

24. Describe in the below criteria about the measures undertaken by your agency for future protection from cyclone, floods and tidal surge (Provide photographs, drawings, sketches and details in electronic copies).

    i. Shelter design measures

    ii. Environmental programme (tree plantation, embankment raising etc.)

    iii. Disaster awareness programme

    iv. Others

25. Did cyclone Aila in 2009 or any other natural disasters occur in your project areas after Cyclone Sidr 2007?
    i. If so, how did the houses perform during that cyclones/ storms/ heavy rain fall/ flood/ erosion/tidal surge?

    ii. What was the households' response? Did they stay in their houses or take refuge elsewhere? How did your agency help them?

Section 3: Site and beneficiary selection process, and house ownership agreement

26. How did you target your shelter programme areas and the house owners in each area?

27. Did your shelter programme target the landless?

    i. If yes, please explain in detail how you selected the new land? How long it took to acquire the land, site preparation and legal approval to build on it?

    ii. If no, what does your agency you plan to do regarding the landless families?

28. What is the minimum and what is the maximum family income of the targeted households?

29. Did any house owners rented or sell the houses/ shelter materials after the project was complete? If yes, why?

30. What type of agreement or legal contract your agency prepared for the families before and after the shelter programme?

31. What type of contracts or legal agreement your agency had to sign with the government or local authorities for the shelter programme?

Section 4: Water Sanitation Specific information

32. Did you provide water-sanitation facilities with your shelter projects and at different phases from emergency to recovery?

    i. If yes, please provide the photographs, drawings and Bill of Quantities /BOQ and detail information of both latrines and water sources. (Electronic copy preferred)

    ii. If no, please explain why it was not provided.

33. How many staff was implementing the programme for water sanitation? Are they same or different from the shelter staff?

34. Have you heard about SPHERE Minimum Standards in Emergencies? If yes, how and what way did you use this standard for the water and sanitation facilities your agency provided?

35. What design measures you have taken to protect the latrines and the water system from future disasters (cyclone, arsenic. Heavy rain, flood, tidal surge etc)? Provide drawings, photographs, sketches (electronic copy preferred).

Section 5: Additional Comments

Please provide any feedback on the questionnaire or any other information from your experience of the shelter programme.

Shelter Working Group
Bangladesh 2007-2009