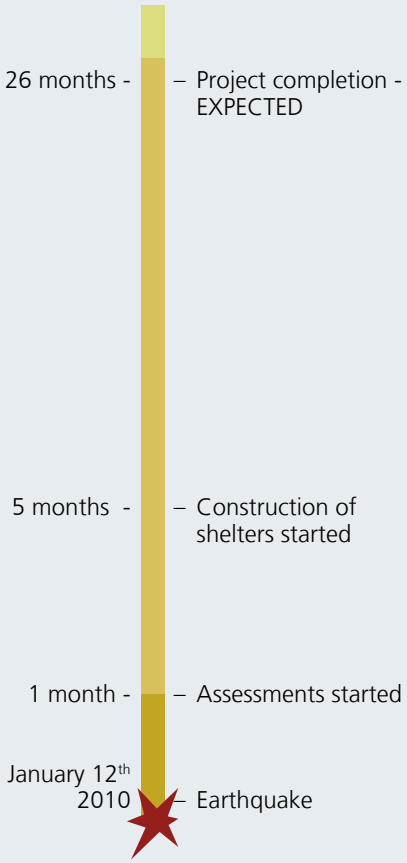
A.8 Haiti - 2010 - Earthquake

Case study:

See "A.4 Haiti - 2010 - Earthquake - Overview", p.12 for background.

Country:
Haiti
Disaster:
Earthquake
Disaster date:
January 12th 2010
No. of houses damaged or destroyed:
180,000
Project target population:
3,960 households
Occupancy rate on handover:
One year after the beginning of the project, the occupancy rate was 89%
Some households did not occupy shelters still covered with tarpaulin for fear of theft
Shelter size:
1-5 people 18m²
6-10 people 36m²
11-15 people 54m²
Materials Cost per shelter:
2,400 USD (18m² module)
Project cost per shelter:
4,700 USD (18m² module)

Project timeline



Project description
This project built progressive shelter in two phases: a first emergency response (structure covered with tarpaulin) and a second durable solution (permanent housing with cement cladding). The project included safer construction awareness activities and safer construction trainings. The shelter project was the beginning of an integrated programme that also included water and sanitation, hygiene promotion, health, disaster preparedness and livelihoods projects.

Strengths and weaknesses

✓ Support was provided irrespective of land tenure.
✓ Modular design allowed for living space to be varied according to family size.
✓ All construction materials, except the steel frames and a part of the roofs, were purchased locally, promoting the local economy.
✓ The project included safer construction awareness activities for all families and safer construction trainings for construction workers.
✓ As a part of the integrated programme, the access to water and sanitation was improved.
× Beneficiary participation in the construction is low as rapid construction was prioritised.
× Power tools were needed to assemble the shelters and as a result generators were required. This had logistical and financial implications.
× Due to lack of understanding of the market, some construction materials were purchased locally. However the local market could not provide these materials easily. This resulted in construction delays.
× The project was still ongoing two years after the disaster, and water and sanitation solutions were not complete.
× Few resources are being allocated to follow up and monitoring of incidents (occupation, evictions, etc.).
- Some of the land where the beneficiaries were living was very close to a river. All the shelters have a raised floor to prevent flood damage. In areas with higher flood risk, a deeper foundation would be built as an additional measure.
- The traditional Haitian house has several exterior doors. Many beneficiaries added doors to their shelter.

Before the earthquake

See "A.4 Haiti - 2010 - Earthquake - Overview", p.12.

After the earthquake

The town of Leogane's population was estimated at more than 134,000 people. The earthquake is estimated to have destroyed 32,000 buildings (around 80% of Leogane's buildings). After the disaster there were around 300 camps in the area, with more than 60,000 people living in them.

The construction of shelter was the beginning of a programme that provided support to affected households. The support also included water and sanitation, hygiene promotion, health, disaster preparedness and livelihoods projects.

Land issues

The shelters were allocated on land where the beneficiaries lived before the earthquake, promoting the return of displaced people to their places of origin.

Land ownership was difficult to verify. Many beneficiaries did not have personal identification documents, and there were many difficulties in obtaining legal and official land property records. There were many owners or heirs that did not have documents to prove that the land belonged to them. Rental agreements with the land owners were made verbally in most cases.

To meet shelter needs of all the people living in the communities, solutions for all households who fulfilled the selection criteria were developed, whatever their tenure situation. Intensive community mobilisation was undertaken, and local authorities were involved.

In the case of owners or heirs without official identification or land ownership documentation, validation meetings were organised where the community certifies their identity and their land ownership. A document was signed by the beneficiary, a neighbour, community representatives and local authorities.

In the case of tenants who lived in houses that were destroyed during the earthquake, it was initially unclear whether the shelter would be the property of the beneficiaries who fulfilled the selection criteria, or whether the shelter would be the property of the house owners.

Shelters had a steel frame and were modular. They could be personalised to meed household needs. Photo: Beti Egea

It was decided that shelters would always be the property of the beneficiaries. A document was signed between the beneficiary and the owners, where the owners authorise the beneficiaries to build their shelters on their land. This document was valid for five years. If the owner did not respect this agreement the beneficiary could move the shelter.

If families were landless, the community networks were encouraged to help them to find some land. There were also negotiations with local authorities to find a solution for beneficiaries who had lived in squatter settlements. Finally authorities let these shelters be constructed.

Implementation

After the validation and signing of the documentation, construction materials were distributed.

The construction team had 4 shelter specialists, 4 local coordinators and 15 local engineers. Each engineer led a team of workers from the communities, and each team built 6 shelters per week.

Up to ninety shelters were built per week, but delays with material supply slowed production.

Beneficiary participation in construction was low. Rapid construction was prioritised, leaving little time to mobilise, train and incorporate beneficiaries into the work.

The shelters were adapted according to the number of people in the family. The basic module is 18m². Families with up to 5 members received one module, families over 5 members received two modules and families with over 10 members received three modules.

The construction of the progressive shelter is implemented in two phases: a first emergency response shelter (structure covered with tarpaulin) and a second durable solution (permanent housing with cement cladding). Different cladding materials were tested for the permanent housing.

A prototype was erected to compare the practicality of installation and the acceptance by the target population. The beneficiaries chose cement cladding as they found it more durable, safer and very similar to the construction technique they traditionally used.

The project included safer construction awareness activities for all the families and safer construction trainings for construction workers.

Shelter made from two modules and later upgraded by family.
Photo: Betisa Egea

Two-module shelter with a door added by the family (standard two-module shelter has two doors, one on the front and one at the back).
Photo: Sandra Tapia

Shelter construction was part of an integrated programme to support affected households and communities, access to water and sanitation was later improved. There were plans to drill bore holes, to provide 70 litres of water per person per day.

Selection of beneficiaries

Coordinated project assessments started one month after the disaster intervention in areas agreed through coordinating with other organisations. 3,960 families living in rural and semi-urban areas of Leogane were targeted.

All of the families of the intervention areas were surveyed. Since this was an integrated programme, shelter support was not only provided to families directly affected by the earthquake, but also to families whose houses did not achieve a certain minimum habitability criteria. The aim was to avoid creating inequalities within the communities.

Selection criteria

The following selection criteria were used:

- Families whose main residence became uninhabitable because of the earthquake.
- Families whose house does not achieve a certain minimal condition of habitability, even if it has not been affected directly by the earthquake. These included:
  - lack of space in relation to the number of people who live there,
  - no water and sanitation.
- Vulnerability criteria:
  - number of dependants, elderly, or handicapped people or children,
  - single-parent families,
  - no monthly income.

Technical solutions

The shelter had a galvanised steel frame with a mono-pitch roof and a raised floor. The shelter was 3 x 6m on plan and had 6 columns spaced on a 3m grid, fixed to rectangular reinforced concrete foundations using a base plate and four ordinary bolts per base. The shelter could be demounted and foundation bolts cut to reuse the frame.

The main structure was made from three primary frames spanning in the transverse direction with rectangular hollow section columns. The roof cladding was corrugated steel sheeting nailed to steel secondary roof members spanning between the three primary frames.

Timber studs are screwed to the steel members and the tarpaulin (emergency response) or the perforated metal sheet of the cement cladding (durable solution) attached to them. Additional timber subframing is used to form windows and doors.

The intention was that the structure could be used in a modular manner, putting two side by side to form a double pitched roof structure of 36m^2.

Logistics and supply

Steel frames were procured internationally and shipped to Haiti. Other materials were sourced locally and transported by trucks to site.

Due to lack of understanding of the local construction materials market it was decided to locally purchase some materials that the local market could not provide easily. This resulted in construction delays.

Materials list

Materials	Quantity
Cement (42.5kg bags)	3 bags
Sand	0.38 m^3
Gravel (20mm aggregate)	0.38 m^3
Iron bars 12 mm	36 m
Column base plate (300mm x300mm x6mm plate)	6 pieces
Steel 2mm (80mm x80mm)	27.65m
Floor beams 2mm (40mm x 40mm)	100.9m
Window and door framing (32.5mmx100mm)	9.9m
Plywood door (1.94m x 0.7m)	1 piece
Plywood flooring (21.8thk)	18 m^2
Steel sheeting (0.75m x 1.83m)	18 pieces
Plastic sheeting (6m x 4m)	4 pieces
Mosquito net	8 m^2
Bolts, nuts + washers (20, 10, 6.25 d.)	200 pieces
Brackets (35wide, 70+20legs, 2thk)	70 pieces
Hurricane straps – angles (75x75)	36 pieces
Self tapping screws	75 pieces
Nails (10, 8, 4 d.)	22.7 kg
Hinges	3 pieces
Door latch + padlock	1 piece
Cement cladding:	
Perforated metal sheet	27 pieces
Cement (42.5kg bags)	16 bags
Sand	1.25 m^3
Natural fibre	0.34 m^3