Review of emergency shelter solutions in Haiti
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This is a technical evaluation of emergency shelter solutions found in Haiti four months after the earthquake of January 12th. It focuses on items that provide the structure and the covering of shelters.

1 Abstract:

This review was conducted in May 2010, in Haiti by Joseph Ashmore over a period of ten days. During the mission, sites in Port au Prince, Grande Guave, Petit Guave and Leogane were visited. Additional discussions were held with key actors working in shelter.

This report classifies shelter items into the categories of **tents** (Section 5), **plastic sheeting** (tarpaulins) (Section 6), **Kits** (fixings / tools / poles / timber / corrugated iron) (Section 7). Other materials such as thatch and cement were not found to have been distributed on any scale. Dependent upon correct targeting, all of these solutions were suitable forms of assistance. However where items distributed were of **poor quality**, they will not survive until the end of the hurricane season, and fewer still will be waterproof for the rains of 2011. Of all materials distributed, the quality of tents is generally of the greatest concern.

This review is the based on the findings of the consultant and does not necessarily represent the views of the members of the shelter cluster in Haiti.

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2 Executive summary:

Material quality

- In Haiti, where national markets are not able to supply sufficient emergency shelter materials, it is **essential that materials are of good quality**.
- In most cases, the programmatic and air transportation costs for distribution items were the same or greater than the materials themselves.

Tents (Section 5)

- The majority of the tents did **not remain waterproof** and required additional tarpaulins. Most tents have an anticipated lifetime of less than 6 months in Haiti, and many are of a poor quality, size or design and are unsuitable for providing family shelter.
- Tents have not held their value as well as plastic sheeting. Four months after the earthquake, the market value of tents in Port au Prince was less than half of their purchase cost. This excludes the actual cost of distribution.
- When of good quality, size and when properly targeted, tents have provided emergency shelter for many families [1] in Haiti. They have created emergency shelters where land tenure is an issue, in dispersed settings on small plots of land, on road sides or in planned camps where population movements have been too fast to build transitional shelters.
- Traditional relief tents ($18m^2$) have proven too large and inflexible for many locations. However, most hike tents that were distributed are too small (less than $12m^2$) for family use.

Plastic sheeting (Section 6)

- Standard relief plastic sheeting has proven effective in providing protection from the rain.
- Quality remains a key issue with the plastic sheeting distributed. Good quality tarpaulins have maintained their value, reselling at 20USD, higher than their initial cost of purchase.
- Access to timber to make shelters is a key limiting factor for shelter quality.
- Wherever possible, plastic sheeting should be distributed along with rope and fixings.

Kits (Section 7)

- Various types of shelter kits were distributed but in smaller numbers than the tents and tarpaulins. The most common items distributed were tool kits, fixing kits and timber.
- Due to different construction practices as well as housing ownership, the most appropriate combination of tools, timber and fixings varies between locations.
- There remains a significant need for timber to reinforce structures.

Pipeline

- Donors and major organisations should develop systems for rapid decision making on when and how to combine NFI pipelines in advance of disasters. Joint procurement was discussed twice in Haiti but not used; Once for the supply of emergency items for distribution and once for materials for transitional shelter construction.

Replacement

- Many vulnerable families will remain displaced with poor shelter into 2011 and beyond.
    - **Targeted** distributions should continue for those not served with distributions to date.
    - A strategy should be agreed for the replacement of degraded materials. However If structures are not improved, plastic sheeting may rapidly become damaged again.
    - An assessment of materials replacement needs should be made following the hurricane season on 2010 in preparation for the rainy season of 2011.

Environment

- The distribution of plastic sheeting required significant amounts of timber sourced in Haiti. However, this was significantly less than the amount of timber burned as charcoal.
- There is a lack of understanding by organisations of where the timber poles came from and a lack of planning to reduce the impacts of its harvesting.

1 A generic specification can be found in: Plastic Sheeting: A guide to the specification and use of plastic sheeting in humanitarian relief, IFRC/Oxfam 2007. www.plastic-sheeting.org

3 Introduction

3.1 Background

In the four months following the earthquake of 12th January 2010, 560,000 tarpaulins, 62,000 tents and 130,000 kits containing tools and fixings were distributed by 80 cluster members. Among these distributed items, there was a significant variation in quality. There was an even larger variation in quality when in-kind-donations and those of the organizations that operated outside the cluster system are included.

Before the earthquake, an estimated 1.8 billion US dollars of remittances flowed into Haiti. This amount significantly increased following the earthquake. There were additionally significant donations to NGOs, many of whom became members of the shelter cluster, many others did not.

Despite the scale of remittances in comparison to the funding of the humanitarian organisations, international organizations have provided the majority of emergency covering materials in Haiti. This is largely the result of the scale of procurement capacity and the logistic supply lines that have been established, as well as the hard work of people distributing for many national and international organisations on the ground

3.2 Methodology

This report is written following a field visit to the major earthquake affected areas of Haiti. During the visit, the consultant met with many of the key actors and stakeholders (see Annex B, Mission itinerary and people met, p.22), as well as disaster affected people and community groups. Key cluster documents were reviewed.

Within IDP sites, cards with different shelter types on them were ranked by groups living in the sites. The report also makes use of market data that was collected during the assessment. Unfortunately there was no price monitoring system in place to identify how markets in second hand shelter materials had fluctuated.

Following a first draft, comments have been received by email and incorporated into this final document.

This report does not mention individual organisations, but the author is thankful for the honest comments, time and support that was received from those working under immense pressure in Haiti.

4 Solutions deployed

4.1 Classification

The following classification was adopted

- Tents (Section 5),
- Plastic sheeting / tarpaulins (Section 6),
- Kits (for structure of covering) with the following key components (Section 7):
    - Fixings
    - Tools
    - Poles /timber
    - Corrugated iron

4.2 Where are solutions appropriate?

		Tents*	Plastic sheet or Tarpaulins
Urban	Own land / adjacent to own land	X	X
	In residential streets near houses	X	X
	Proximity sites / spontaneous sites		X
	Planned camps	X	X
Rural	Dispersed (with access to timber)		X
	Grouped in sites		X

**Note@ in many cases, tents were distributed where they lead to sites being over congested.*
Tools, fixings, timber and corrugated iron were mainly distributed in rural areas, and so comparisons were not possible.

Tents: In locations such as roadsides, on top of damaged buildings, in rapidly built planned camps, and in the compounds of humanitarian agencies, good quality tents (Section 5) have proven useful emergency shelter solutions.

Tarpaulins: In all locations, plastic tarpaulins have been of use to families, but the quality of shelters built is often severely limited by the lack of **timber** and **fixings**.

Kits including tools, fixings and materials: Most standard kits of tools and fixings are adapted to timber construction, with tools being geared towards rural livelihoods rather than rubble clearance. Some organisations are developing kits of tools, fixings and timber for use in urban areas. Many organisations have concerns about encouraging the use of metal roofing sheets without being able to ensure the safety of structures (given the threat of hurricanes) or encouraging reinforced concrete construction built with unskilled labour (given the threat of earthquakes).

Tents have been used in locations where transitional shelters could not be built such as on roadsides in front of people's houses (left) or in planned camps (right) which have to be built quickly

Pull factors

The humanitarian distribution programmes have provided support for over one million Haitians, but have also lead to increased congestion in sites, and potential accompanying health risks to the population. As a result of many distributions, there are now many informal settlements with an overall density higher than $5m^2$ per person. This should be compared to an agreed minimum of $30m^2$ per person for planned sites in Haiti[2].

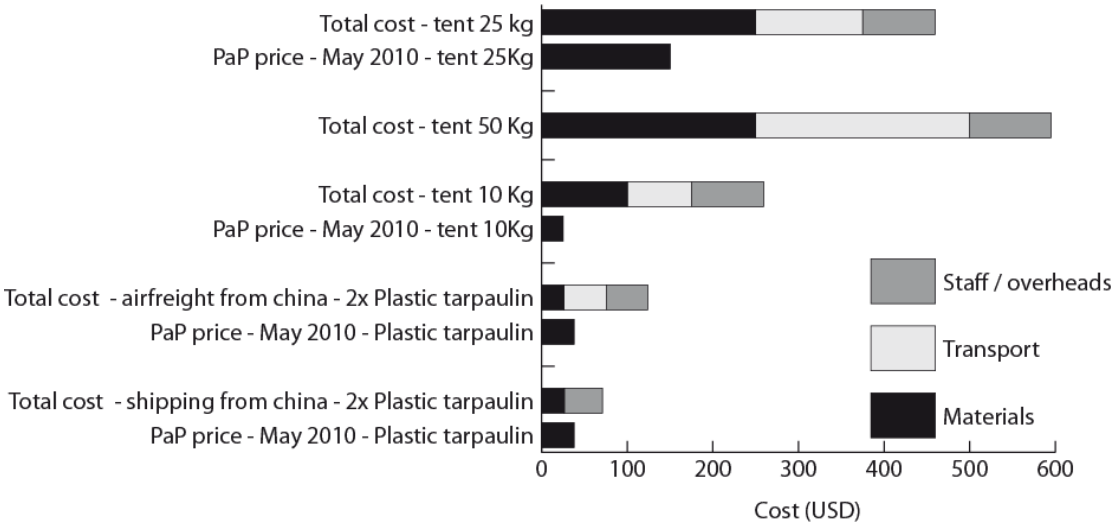
In addition to creating pull factors towards individual sites, there is a pull towards Port au Prince where the majority of relief has been distributed and where most humanitarian programmes have been implemented.

To compound the challenges there are a significant number of fake shelters and even entire fake camps. On one site visited during the survey, it was claimed by occupants that there were 176 families on a site in reality occupied by no more than 2 families, living in adjacent houses.

Example of a fake shelter site - this site was unoccupied but placed so that recipients could qualify for relief distributions.

4.3 Market value and cost

Cost of delivery



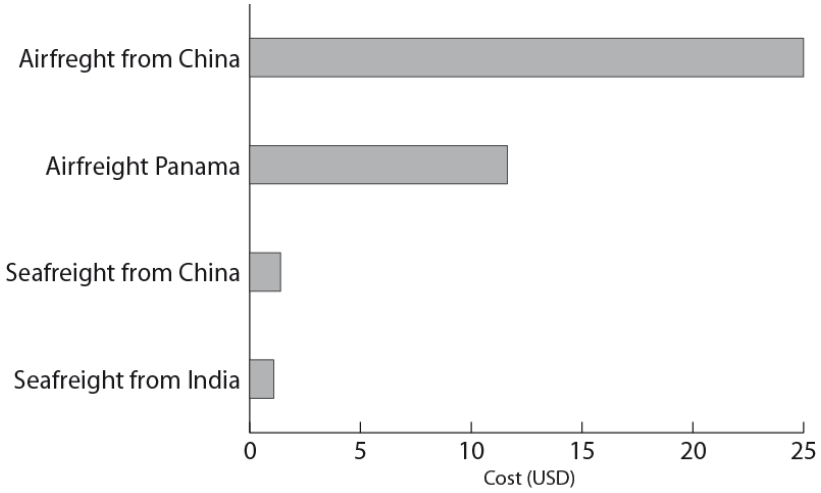
Graph 1: Illustration of the cost of delivery of materials for one household – Staff / overheads costs based on actual budget data from an NGO, and include all related components of an emergency distribution programme. It does not take into account the household items that were distributed alongside the tents/tarpaulins Transportation costs are based on air transportation from China.

[2] Camp Planning Standards Safer Shelter Strategy, Temporary Relocation 31 March 2010, from http://groups.google.com/group/cccmhaiti

The actual cost to deliver items to families is often in excess of the cost of the materials themselves (see graph 1).

Using air freight to transport a tent or a tarpaulin can more than double its cost. Adding the programmatic costs of delivery (including staff, accommodation, vehicles, support for registration, distribution, training and follow up monitoring) will add to the total cost of the materials. As a result, a tent that costs 250 USD at the factory door may cost in excess of 500 USD to deliver. This does not include the opportunity costs of delivering to meet needs in a limited timeframe, and the need to distribute additional tarpaulin at a later stage to waterproof leaky tents.

The economics of aid means that many organizations were tied to goods in kind, reducing control over procurement, and complicating calculations surrounding the actual cost of delivery. Organisations that operated with reduced staff overheads and associated costs often passed them onto other organisations by providing materials but not engaging in the assessment, identification, selection of beneficiaries or the monitoring of distributions afterwards. These activities are essential expenses when ensuring that aid actually meets the needs of the most vulnerable of families.



Graph 2: Comparison of transportation costs in US dollars for one tarpaulin either direct from the manufacturers or from regional stockpiles. Sea freight from China to Haiti took between 4 and 6 weeks.

A market exists in second hand plastic sheeting. Left: a street market, right: a street hawker

Following distributions, markets have emerged in the resale of tents and tarpaulins. Tarpaulins can be found on street side stalls or sold by street hawkers purchasing them and then reselling them for a 30% mark up. It also appears that there is a trade, purchasing tents in Jacmel and transporting them to Port au Prince for resale.

Four months after the earthquake, the market price of tents in Port au Prince is significantly lower than their cost at the factory door, whilst a tarpaulin now more costs on the streets of Port au Prince than it costs to purchase it and ship it to Haiti in bulk.

Before tents and tarpaulins

Makeshift shelters before the arrival of tarpaulins were not waterproof

In the weeks and months before tents and tarpaulins were distributed, and in areas where they have not yet reached, families used sheets, cardboard, blankets and recycled blankets to build shelters. Most of these shelters were not waterproof and provided no protection from the first rains.

Shelter after tents and tarpaulins

As anticipated in the initial shelter strategy, the plan to build transitional shelters will take until 2011 to be fully realized. Shelter remains a critical issue in Haiti, especially with the forthcoming hurricane season which threatens many of the tents and emergency shelters built so far.

Challenges such as identifying the families who are most in need of support, identifying land for shelters, removing rubble and moving large volumes of materials through Haiti's already crowded roads mean that many families may well remain in emergency shelters for years to come.

5 Tents

5.1 Overview

During the mission over 14 different types of tent were observed. These varied in shape, design and colour. However the most critical factors were the variations in size, and quality. One individual organization providing logistics for goods in kind, handled over fifteen different types of tents of varying qualities.

Cultural acceptability

In the weeks following the earthquake there were many requests for tents, and shortage of tents became a significant issue in media reports. As a transitional shelter strategy was adopted and distributions of shelter materials increased so these requests faded.

Although many of these requests were the result of expectations of what people might receive rather than what would be most useful, they do indicate that tents had a role to play in the earthquake response. It is also possible that clean and tidy tents are culturally preferred, being seen as more modern by many urban living Haitians. The alternative of bush poles with plastic sheeting fixed to them might feel more like a return to village living.

However, even with only twelve poles, one kilogram of nails, and bottle caps for fixing the plastic sheeting, most people agree that plastic sheeting with poles is more waterproof and stronger against the wind than a tent. They are also cooler than tents which proved uninhabitable during the day.

Quality

The quality of tents in Haiti is highly variable. A combination of old stockpiles, hurried procurement against weak specifications, and procurement departments who have limited experience in dealing with tent suppliers has lead to tents that will have a limited lifetime. A significant proportion of tents will not last until the end of the hurricane season.

The shelter cluster did provide guidance on tent procurement and on the use of tents. This is copied in annex (Annex B - Position on tents in Haiti)

Size of tents

There was a significant variation of size of tents delivered in Haiti, from 1.5m^2 hiking tents to 18m^2 family tents to through large marquees used as collective shelters.

The shelter cluster in Haiti agreed that given the space limitations, and with suitable mitigation plans, transitional shelters can be built with a covered area of less than 18m^2. Practically on the ground organizations are talking about 12m^2 or 14m^2 transitional shelters for urban areas. However, standard tents for most agencies have a covered area of 16m^2 or 18m^2. As a result, standard tents are larger than many transitional shelters in Haiti.

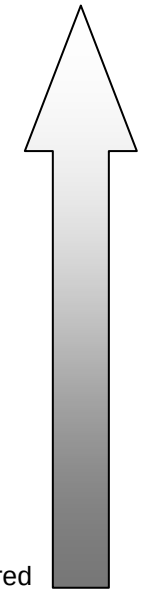
It was noted by several sources, that where tents were distributed in dense urban settlements, they lead to families being evicted as there was insufficient space. In some cases there were claims that they even lead to gangs moving into some sites and occupying the tents.

Foot print

Different designs of tents require different amounts of space to properly erect. (the amount of space for tent plus guy ropes is known as the footprint) Commonly ridge tents require a significant amount of space for the poles as well as the covered living area.

Which tents did families prefer?

Families were consistent in agreement over which were the best tents.

Market prices and satisfaction on tent designs*			
	description	Current market price in Haiti	preferred  Less preferred
	High quality frame tent	Price unknown	
 	Tunnel tent (LWET) / Large dome tent	125-160$	
	Various larger dome / tunnel tents	60-100 - dependent upon quality	
	Canvas ridge tent (non-rot proofed)	Unknown	
	small hike tent	15-25$	

**Based on ranking exercises conducted in displacement sites and market price surveys in Port au Prince.*

***Improved designs of canvas tents, and canvas tents with known quality of polycotton canvas covering were not found during this field assessment- it is possible that many of those seen were from old stockpiles or procured against questionable specifications.*

Design issues

Most feedback regarding canvas tents was negative, but this may have been the result of the majority of them being made from poor quality and untreated fabric. In many canvas tents, there was insufficient rot proofing and waterproofing, and as a result many tents had mildew and were found to rot.

Many of the synthetic tents had ripped or were beginning to show signs of wear, particularly where stitching was under tension.

Pegs

Many pegs were too short and pulled out of the mud after rains. This was most critical for the tent designs such as ridge tents that require ropes under tension to hold them up.

In other locations, such as the sides of tarmac roads, the ground was too hard for pegs, again making ridge tents harder to use.

Bathtub groundsheet

Bathtub floors (where the ground sheet is sewn into the tent) were more popular than separate groundsheets, as surface run off was a considerable issue in many sites.

Stitching

Many families noted that the first place for many tents to fail was at the stitching. In part this was due to poor design detailing, but poor tent erection also played a part. To remedy this, some organizations spent time training families to correctly erect and maintain their tents

5.2 18m^2 tunnel tent

Description: These tents are generally of a good specification from major international organisations. They have flexible poles (usually fibreglass) and a fly sheet with an inner liner.

Lifetime: After less than four months many of these tents were still standing. However, the majority were covered in tarpaulins because they leaked. Some of the fabric was seen to pull where the stitching was under stress

5.3 canvas ridge tent

Description: Traditional canvas tents. Some have higher walls than others, and these ones were preferred

Lifetime: The key issue with these tents was quality. Many were poorly rot-proofed and were dark with mildew after only a few months, limiting their lifetime.

5.4 Frame tent

Description: Frame tents with heavy duty canvas covering. The samples observed were generally of high quality, and heavy (and hence expensive to airfreight), coming from national emergency stockpiles from Europe.

Lifetime: As a result of the quality of these tents, it is expected that they will last over one year.

Comments: Families were positive about the tent quality but said they were too hot and did not use them by day

5.5 Dome tent

Description: Dome tents with glass fibre poles and synthetic coverings (approx 14m^2)

Lifetime: Anticipated 6 months

Comments: Families were positive about the tent quality but said they were too hot and did not use them by day. Many were covered with tarpaulins as they had begun to leak.

5.6 Small hike tents

Description: Tents designed marketed for the hiking markets.

Lifetime: Dependent upon the quality between 15 days and 6 months

Comments: People said that these were only used for sleeping in for a few days but were generally too small. For some the quality was very bad and they had already broken.

5.7 Marquees and multi-family tents

Description: Large tents – often ex military used for collective shelter. Many later re-used for temporary classrooms.

Lifetime: Long lifetime, though require maintenance, as there is a risk of pegs pulling out.

5.8 Other tent like solutions

Description: Kits to make emergency shelters, such as the one illustrated above, which uses PVC water pipe.

Lifetime: Maximum 6 months depending upon maintenance, materials and design. Many failed sooner.

Comments: None of these designs were fabricated on the scale required to meet large scale needs. Plastic water pipe bends more in the sun and the hot climate of Haiti.

6 Plastic sheeting / tarpaulins

6.1 Introduction

Examples of shelters build with plastic sheeting. Left and right: "box frame"; centre: "A frame"

The majority of shelters built since the earthquake using plastic sheeting have a box frame, consisting of poles embedded in the corners and in some cases horizontal poles connecting the corners of the shelter. A small minority are made using an A frame structure (see photo above). Commonly 12 poles are used for a shelter. The quality of the structures is highly dependent upon the amount of timber that the family has been able to find or purchase. Some of them use string between vertical poles (instead of timbers) to hold the roof sheet up.

Less than 1/3 of emergency shelters have salvaged metal roofing, the majority use plastic sheeting or bed sheets for roof and walls.

In a survey with limited sample size conducted by CARE the average shelter size was found to be just over $10m^2$, however, this depends a lot on site layout. In some crowded sites in Port au Prince many shelters only provide $4.5m^2$ total covered area.

It is estimated that less than ¼ of structures will survive any serious wind loads, as they use timbers that are far too small. Most families have enough space to plant pegs and tighten the shelter with ropes. Fewer than 1 in 15 shelters have no space for pegs.

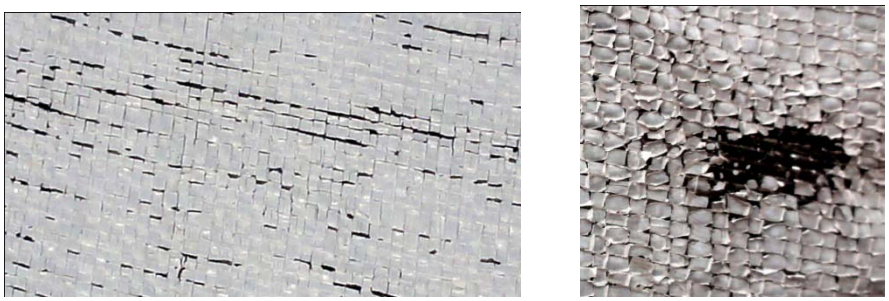
Most families keep their valuables and documentation in the shelter (in a suitcase / piece of furniture /under the mat etc.), and security is a significant concern for many Haitians.

The use of tarpaulins

To build a standard shelter, families must make an input of around 30 USD. Families commonly buy 12 poles (12USD - 22.5USD); two pounds of nails (2 x 1 USD) and three bundles of wire (3 x 2 USD). Many families also buy the tarpaulins.

The largest challenge with the use plastic sheeting is that it is often not fixed tight so that it flaps with the wind. It is often stretched over sharp sticks or sharp corners of the structure so that it is more likely to rupture and leak.

Quality of tarpaulins



Close up photograph of damaged standard plastic sheeting. Left: the sample has deteriorated due to exposure to the sun, right: the sample has whilst the sample on the right has rubbed against a sharp timber pole. It is likely that there is a failure in quality control and the supplier has not produced the plastic sheeting to the agreed specification

The variation in tarpaulin durability observed in Haiti was primarily due to many samples being poorly specified. However, there is some evidence that some of the plastic sheeting delivered did not meet agreed specifications. Although proving this would require laboratory testing,

many of the samples with markings by known suppliers did not perform as well as they should, and were observed to delaminate.

Why do shelters leak?

Some reasons for shelters leaking include:

- Surface water leaking in under the shelter
- Poor quality of sheeting which easily ruptures or degrades with sunlight. (either purchased to poor specification, or sheeting supplied by manufacturers not meeting agreed specifications)
- Poor structures and fixings leading to:
    - Water leaking between sheets
    - Slope of roofs being too shallow or puddles forming in the roof
    - Sticks poking through and rupturing the sheets
    - Sheets flapping in the wind and degrading rapidly.

Timber poles

The distribution of tarpaulins undoubtedly lead to large numbers of trees being cut. Surveys by the Rapid Environmental Assessment team[3] noted that the timber is often sourced locally. The increase in demand is highlighted by the costs of timber poles doubling since the earthquake.

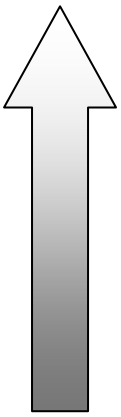
Over 15 days, it is estimated that families in displacement sites consume the same volume of timber in charcoal as they have used to construct a basic shelter[4]. However shelter construction requires a different quality of timber than charcoal production. Longer poles are often made from entire young trees, and not all species of tree are suitable. Cutting these trees reduces wood assets for the future, and in general shelter programmes in Haiti have not addressed this asset loss.

In the future, construction timber needs will increase, as families move to more solid structures to support roofs made from either plastic sheeting or corrugated iron. Haiti's forestry resources are limited, and large volumes of timber at subsidised rates for earthquake affected families will be required so that they can afford the imported timber.

One organisation did deliver kits which included two steel poles. Although the poles were being used, and would last for several years, they were found to be insufficient in quantity to build emergency shelters of the type that is built in Haiti.

3 Rapid Environmental Impact Assessment: Haiti Earthquake, March 12 2010, CHF International, Sun Mountain International.

4 Calculation based on: Timber volume per shelter: approximately 0.168m3 - (assume 12 poles per shelter assume average pole dimension 2.5m, 7.5cm dia.) Timber consumption per family: 0.012m3: (assume 2kg charcoal per family per day, 170kg charcoal per m3 wood)

Market prices and satisfaction on plastic sheeting*			
	USAID specification	19USD / sheet	preferred 
	MSF/ IFRC/ OXFAM/ UNHCR specification	19USD / sheet	
	Braided blue	15USD /sheet	
 	Blue woven lightweight Other qualities	12.5USD / sheet or less	Less preferred

*Based on ranking exercises conducted in displacement sites and market price surveys in Port au Prince.

6.1 USAID SPECIFICATION

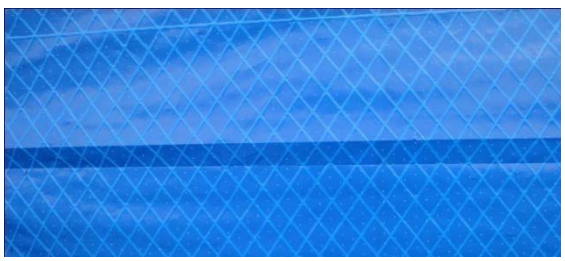
This was the most popular type of plastic sheeting

6.2 White with grey stripes

This is woven polyethylene sheeting with a black core, and white laminations.

Note there were several varieties with the same colouration, but of inferior composition.

6.3 Braided / laminated - without black core (blue)



Braided plastic sheeting blue and slightly translucent

Families said that this type of sheeting made shelters hotter than other shelters and let light through, reducing privacy.

6.4 Other specifications

Many different specifications of plastic sheet can be observed on shelters and in the markets. Those illustrated above are both woven, but with are relatively light weight and decay rapidly in the strong sunlight of Haiti.

The majority of poor quality sheets were distributed by external organisations rather than imported by traders. One major donation of more than 10 containers from a major donor was of substandard plastic sheeting, and organisations distributed informing families that it should not be used for roofing as it would leak.

7 Kits and building materials

7.1 What are kits for?

Kits are bundles of items, collected together to help simplify logistics and distribution. In this section we will focus on kits whose primary purpose is to provide a structure, a covering, a means to fix the roof to the structure.

Items required for a timber framed shelter

A shelter requires: →

Structure
- Timber (sawn)
- Timber (poles)
- Poles (metal)
- Masonry (cement etc.)

+

Covering
- Plastic sheeting
- Corrugated iron

+

Fixings
- Rope
- Wire
- Nails

Some kits are intended to provide a combination of these functions whilst also supporting activities such as agricultural livelihoods or rubble clearing.

Examples of which tools are required for which function:

Construction

Timber
- Hammer
- Saw
- Spade
- Machete
- Pliers
- Axe

Masonry
- Trowel
- Spade
- Stone chisel
- Heavy hammer
- bucket

Drainage
- Spade/ shovel
- Pick axe
- Hoe
- Bucket
- Wheelbarrow

Rubble removal
- Crow bar
- Sledge hammer
- Bucket
- Wheelbarrow

Agricultural livelihoods
- Spade /shovel
- Pick axe
- Machete
- Hoe

7.2 What is in a kit?

Kits of tools, fixings or structural materials were distributed in far fewer numbers than plastic sheeting, and hence it is harder to evaluate their impacts and qualities.

The most common components of the kits (excluding household items), distributed in the first four months after the earthquake in Haiti were:

- Plastic sheeting
- Fixings (rope, nails, roofing nails)
- Tools (hammer, saw, spade, machete, axe, pick axe, hoe)
- Timber (sawn / imported)
- Corrugated iron
- Poles (metal)
- Pegs

These different components were combined into kits in different ways by the various organisations. Some examples are:

- Shelter kit: Tools and fixings (rope, wire and nails), with two tarpaulins in a separate package,
- Shelter kit: Two tarpaulins and 30m rope along with two metal poles and eight pegs.

7.3 Tracking distribution statistics

The shelter cluster tracked distributions and pipelines of tents, tarpaulins, fixing kits, and household tool kits

One of the many challenges is how to track kits as they vary between organisations, for example, a household tool kit may include fixings. With timber, the challenge is whether to track volume distributed or families served, given that different organisation will distribute differing quantities per family. In practice the volumes distributed and number of family supported in the first four months of the response were low.

7.4 Fixings

Beyond the shortage of timber in emergency shelters, there is also a shortage of rope, nails and wire holding them together.

A limited number of organisations brought in plastic sheeting packaged with rope, and a few others distributed rope separately. However the amount distributed was relatively low, and for a relatively small investment, shelters could be increased in strength.

Most fixings kits were distributed in rural areas with toolkits. There were some (unverified) stories of nails being purchased by the pound and then resold individually, indicating a need for fixings, but an inability to afford them.

7.5 Tools

Most toolkits are designed for timber framed construction. Most toolkits were targeted at rural areas for the following reasons:

- The majority of construction in urban areas was masonry before the earthquake
- Access to low cost timber is greater in rural areas
- Many toolkits contain tools which have secondary uses in agriculture. These would be less useful in urban areas.

Some toolkits contain machetes. Most organisations elected to remove them from stockpiled toolkits for security reasons, leading to additional work in warehouses.

7.6 Rubble removal

Visiting the earthquake the number of people removing rubble with limited or inappropriate is striking. Anecdotally, on several occasions, the consultant noticed, people attempting to break up fallen buildings with small hammers as opposed to sledgehammers, without wheelbarrows or good quality buckets and certainly without any safety equipment.

7.7 Timber and corrugated iron

As noted above under section 6.1, the stability of shelters is frequently compromised by a shortage of timber. As Haiti is short on forestry resources, large volumes of timber will need to be imported. However, imported timber is too expensive for low income Haitian families

During the first four months only a few organisations have distributed timber, and it can be seen in some shelters and repaired houses. However, timber is a bulky material to distribute and requires some skill to use. At the sites visited where imported timber had been distributed, it was of too small a section and in too low a quantity to make a significant difference to the stability of structures.

Few organisations have elected to distribute corrugated iron. This is because the structures are generally too weak to support the roofing sheets and there are concerns that it will be dangerous in high winds if improperly secured. As with timber, the major distributions of corrugated iron are planned to be part of transitional shelter programmes. To build 100,000 transitional shelters, approximately 2 million roofing sheets and at least 50,000m^3 of timber will need to be imported.

Annex A Mission TOR

A Review of the Performance of Emergency Shelter Solutions in the 2010 Haiti Earthquake Operation

Background to the Review

A 7.0 magnitude earthquake struck the Haitian coast on 12 January 2010, 17:00 hours rocking the capital and setting of a tsunami alert in Haiti and neighbouring countries. The epicentre was located 22 kilometres from Port-au-Prince, and 15 kilometres from the closest towns. The most affected area was the Ouest province, with an estimated total population of 2.2 million people. The most affected cities were: Port-au-Prince, Carrefour, Leogane, Petit Goave, Grand Goave, and Jacmel.

The Government of Haiti requested international assistance and clusters were activated. The Shelter & NFI cluster was initially led by IOM but on the 3rd of February it was agreed that IFRC would lead it from the 10th of February. The International Federation sent a Shelter Coordination Team to support the Haitian government in the inter-agency coordination of shelter actors. The website of the Shelter & NFI Cluster is in www.shelterhaiti.org

The Shelter & NFI Cluster members undertook a massive emergency shelter operation that managed to provide emergency shelter support to the total targeted population, more than 300,000 households, before the target date, 1st of May, in less than four months. This emergency shelter assistance used different solutions, the main categories being: two tarpaulins, two tarpaulins + fixings, and tents. These three categories group responses of very different specifications. More than 60 organisations were involved in the distribution of emergency shelter solutions.

The Global Shelter Cluster would like to have the means to provide evidence-based advice on the performance of the different shelter solutions. This would help the shelter cluster members choose the solutions that perform better for the different situations of the affected households. The 2010 Haiti Earthquake response is the perfect environment to gather this evidence due to the size of the operation, the number of actors involved and the contained geographical extension of the response.

Objective of the Review

The objective of this review is to provide evidence-based advice on the performance of the different emergency shelter solutions based on the Haiti response.

In order to achieve this objective it is expected that the consultant will:

- Identify the different solutions or categories of solutions used by cluster members and others in the Haiti operation.
- Appraise the performance of the different solutions used in the Haiti operation in regards to the following factors:
- Physical resistance over time, how well they behaved after time passed and as they were used. How long did the solution last before it became useless?
- The situation of the affected household. What solutions performed better for the different settlement options?
- The use that the households made of them. What solutions were better value?
- Other factors beyond the design of the solution that had an impact on the performance of the solution. What else mattered beyond the shelter solution?
- Give recommendations to improve the performance of these solutions in future responses.
- Give recommendations as to how these categories of solutions could be better defined in the future so that the responses of the cluster members would be more homogeneous.

Scope of the Review

The review will encompass, but not be limited to, the following areas:

- Emergency shelter solutions distributed by shelter cluster partners, organizations working outside of the shelter cluster, as well as solutions used by the local population. This includes the Haitian authorities at national or local level, UN agencies, members of the Red Cross Red Crescent Movement, intergovernmental organizations such as IOM, International NGOs, national or local NGOs, civil society, the military, private sector, and other interventions.
- Traditional emergency shelter solutions such as plastic sheeting, tents, construction materials, tools, fixings, and any other quickly deployable solution that can be used by the household to erect something that can cover its emergency shelter needs.
- The review will not include shelter programming that does not provide materials to families. Thus the use of host families, collective centres, rented accommodation and similar alternatives will not be looked into.

Methodology

The methodology employed by the reviewer/s in gathering and assessing information should include:

- A field visit to Haiti and to different locations where emergency shelter solutions were distributed;
- Review of available documented materials available in the Shelter & NFI Cluster website;
- Interviews with families that have received emergency shelter support (beneficiary perceptions regarding the extent to which the emergency shelter response is fulfilling their needs, and their satisfaction with the product);
- Interviews with some of the Shelter Cluster Coordination Team members and in particular the Technical Coordinator;
- Interviews with key stakeholders, in particular Government officials where possible;
- Interviews with UN OCHA and other cluster representatives, specially CCCM;
- Interviews with shelter agencies participating in the Emergency Shelter Cluster, and in particular members of the Red Cross Red Crescent Movement, IOM, CRS/Caritas, CARE, and other main actors as well as donors and local actors;

Proposed Timeline

The exercise will be implemented over a period of 21 days between 17th May 2010 and 17th June 2010, the date of the travel to Haiti subject to agreement with the Shelter & NFI Cluster Coordinator.

Outputs

- Concise, written document with key recommendations and supporting information. This document should be of use for discussing the findings internally and also with key donors and other stakeholders.
- Photographs that explain and give evidence on the issues discussed in the document. The most relevant photographs will be included in the report and will be given in soft copy. Less relevant photographs will be given in soft copy only. If possible photographs will be georeferenced.
- Additional notes, summaries of interviews etc. as appropriate, or supporting documentation.
- Summary of review activities undertaken, including interviews, visits, documents reviewed etc.

Annex B Position on tents in Haiti

Document date 15th February 2010

Source Shelter Cluster Haiti Transitional Shelter Technical guidance

Position on tents

Tents will continue to be received at the airport and will continue to be distributed, but they are not a long term solution suitable for the hurricane season.

Purchase is not encouraged unless organisations have existing expertise in the procurement of humanitarian tents.

Tents in context

- In the first days of the crisis, there was considerable focus upon the provision of tents. However as time has passed this situation has now changed.
- Across Haiti, affected families have started to build very basic shelters with the materials available to them. This is a process that should be supported through provision of suitable materials rather than ignored by the provision of tents.
- Given the various operational and logistic constraints with the distribution of materials, resources need to be focussed on getting water proof cover to affected people as quickly as possible.
- Tents provide a short term shelter solution, but have a limited lifetime in hot humid climates. As a result significant funds are used with limited long term advantage to the occupants.
- There is not enough room for tents in high density sites. Tents have a larger footprint than self built shelters.

Tent quality

- Past experience has shown that when large quantities of tents are purchased at short notice, the quality remains unpredictable. Even the briefest visit to the earthquake affected areas of Haiti will show a huge diversity of tents distributed.
- Many of the tents will not remain waterproof for the heavy rains due later in the coming months. Many others are simply too small.
- Tents specialised for humanitarian relief have been developed over many years by major organisations.
- To purchase suitable tents requires establishing clear specifications and understandings with manufacturers.
- Rapid procurement invariably results in substandard quality of tents.
- Even good quality tents have a lifetime less than a year in hot and humid climates such as Haiti.

As an example in a survey of the estimated 400 000 tents distributed after the Pakistan earthquake in 2005 over 80% were found to be unsuitable for the weather. Most of the distributed tents required remedial distributions of plastic sheeting. This caused significant delays.

More on tents can be found at “A guide to the use and logistics of family tents in humanitarian relief” http://ochaonline.un.org/OchaLinkClick.aspx?link=ocha&DocId=1002112

More on plastic sheeting can be found at http://www.plastic-sheeting.org

The way forward

- Plastic sheeting is a well proven material in disaster response. Very clear and well established standards were developed in the mid 1990’s. When combined with suitable fixings and salvaged materials, very strong and waterproof shelters can be built
- As Haitians have already started work on shelter construction. It is far more efficient to assist Haitians to improve and secure accommodations they have already started, rather than introducing a new, less preferable solution.

Annex C Mission itinerary and people met

18 may – Dominican Republic	
Gregg MacDonald	Shelter cluster coordinator - February - May 2010
Wan Sophonpanich	Shelter cluster information Manager - January - May 2010
19 May - Dominican Republic / Port au Prince	
Jeroen Quanjer	Shelter cluster technical advisor (outgoing)
Gerhard Tauscher	Shelter cluster coordinator
Xavier Genaud	IFRC movement shelter coordinator
Pat Naidoo	Shelter cluster logisitic advisor
Sandra Sudhoff	Shelter cluster IM (GIS)
20 May	
	Shelter cluster meeting Leogane
	Site visit Legoane centre
Site residents / site managers:	*Site visit Sando*
Stephane Savaimuthu	Outgoing shelter cluster coordinator Leogane / grande /petit guave
Kidner	DPC Grande Guave
Irma Velazquez	Shelter cluster coordinator Leogane / grande /petit guave
Timo Luege	Shelter cluster Media ancd communication
Edward Benson	Shelter cluster hub coordinator
Giovanni Cassani	IOM / CCCM coordinator
Yin Min Aye	Shelter cluster IM
21 May	
Site residents / site managers:	*Site visit - Grande Guave*
	Site visit -ti paradis
	Site visit -aux gentile
	Site visit -roadside sites btween grande guave and petiti guave
Frank Lapotte	Maire adjoint / chef du DPC - Grande Guave
Irantzu Serra Lasa	Red Cross - Les Cayes
Irma Velazquez	Shelter Cluster coordinator Leogane
Stephan	Shelter Cluster coordinator Leogane - outgoing
22 May	
Shaun Scales	CCCM Cluster - site planner
Isabelle Giasson	IOM camp management programmen manager
Pierre-Yves Oger	Hub Coordinator Jacmel
Anissa Toscano	DfID CHASE
Haun	IOM warehouse manager
Aminita Gutierrez	IOM information manager
23 May	
	Site visit - Auto Mecca
Domia Rene	Responsable du site – Auto Mecca
Xavier Genaud	Red Cross / Red Crescent - shelter coordinator

Jim Kennedy	Shelter programme manager - CARE International
Mike Meaney	Habitat for humanity Director of Program Haiti Earthquake Response
Laura Heykoop	Habitat for humanity - Emergency Shelter Kits Coordinator
Tina Kiehn	Habitat for humanity - Monitoring and Evaluation
Alex Coissac	IOM - Shelter Program Manager
24 May	
	Site visit champ du mars
Gisandre de Riviere	ICRC - responsable cooperation
Amos Paul	ICRC- field officer
Orianne Aymard	ICRC - delegue protection
Brigitta Kunz	ICRC - Delegue cooperation
Nuno Nunes	IOM - Previous shelter cluster coordinator
Miguel Urquia	IFRC shelter department Geneva
25 May	
	Shelter cluster meeting
Nicola Jones	Programme manager - shelter box
Kathleen Miner	USAID-OFDA
26 May	
	Shelter cluster hub meeting PaP
	Field visit Delmas 33
Bertrand Sergile	Save the Children PaP
Don Jonston	Finnish Red Cross
Carmen Ferrer	IFRC - Shelter coordinator
Julien Mulliez	CARE Haiti - Emergency Shelter Advisor
27 May	
Lorena Stephen	IFRC logistics
Jean Christophe	UNHABITAT - Head of mission
Corrinne Treherne	(by email) IFRC - Senior Officer - Shelter and Settlements department