EMERGENCY SHELTER CLUSTER
SOUTH ASIA EARTHQUAKE
PAKISTAN

TECHNICAL GUIDELINES FOR WINTERIZATION STRATEGY (Dec'05-Jan'06)

1.0 Overview

This winterisation strategy paper provides technical guidelines for the upgrading of non-winterized tents and for the use of shelter kits to reach minimal winterisation standards. It is the output of interagency discussions including field and headquarters staff from many organisations including; CARE, CRS, Feed the Hungry, FRC, GOAL, ICRC, IFRC, IOM, MSF, OXFAM, Save the Children UK, Sungi Development Foundation, Tearfund, UNHABITAT, UNHCR, UNJLC, UNDP and WWF. It complements rather than replaces existing shelter strategies which aim to provide materials to help people make transitional shelters on their own land or to make repairs to existing buildings.

As of mid-November, there had already been some cases of hypothermia and death directly due to cold. Acute respiratory infections are set to increase. In many cases these will be attributable to insufficient physical shelter. Additional and continued support is required to prevent further excess mortality.

Continued focus will be required for shelter support to non-displaced people above the snow line, which will descend below 5000ft through December and beyond. In that context, this document proposes:

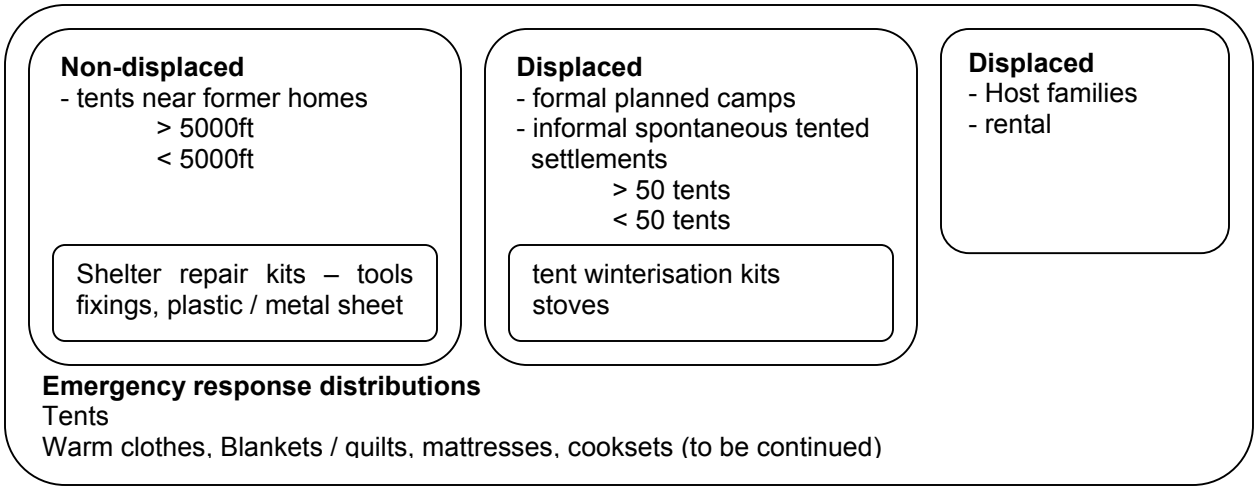
- Extended distribution of personal insulation materials (particularly blankets/quilts and clothes) as primary shelter support for all affected people.
- Distribution of plastic sheeting, rope and basic flooring insulation as key tools for upgrade and winterisation of tents for displaced people. **(section 3)**
- Distribution of plastic sheeting, metal sheeting, rope, fixings (nails) should continue for people on their own land, both above and below 5000ft. **(section 4)**
- Where possible replace broken or very poor quality tents that are the primary residence of displaced people.

Additional shelter winterisation measures include:

- Ensure that people are allowed to upgrade their shelters on site. This includes, the building of low walls, excavating (dependent on water table) or raising floors (dependent on the materials availability). **(section 4)**
- Hold public awareness campaigns at the point of distribution of all shelter equipment to explain the risks of cooking and heating and fire inside tents.
- Ensure that people have access to tools to dig adequate drainage and that drainage is dug.
- Ensure that tents are orientated with their doors away from the prevailing wind and are located in suitable sites.
- Provide Fire points (Barrels and water buckets) and crews or committees in grouped settlements for more than 10 tents.

2.0 Introduction

2.1 Introduction - settlement

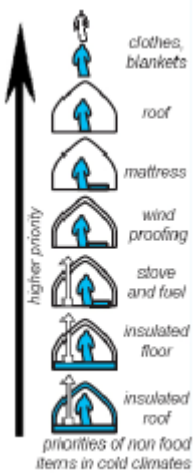


Non-displaced people (section 4.0)
For people who have not been forced to leave their own land, providing roofing materials (plastic and CGI sheeting), kits of tools and supporting Non Food Items (blankets, Wood burning stoves) remains the best way to support people to make structures to help them to survive the winter. At the same time the provision of material support will support early recovery and support shelter for livestock. It is assumed that people have salvageable construction materials and timber available. Wood will be the primary heating cooking fuel. Tents will also provide a temporary shelter, but it is expected that the majority of people will be able to construct more solid shelters than tents once materials become available.

Displaced people (section 3.0)
Of the people who have relocated, many are living in tents. These people are especially vulnerable to cold as poor quality tents may be their primary or only choice of shelter. Tent winterisation upgrade kits will provide appropriate support. They will consist of the basic materials to render the tent waterproof, to block draughts and to provide basic insulation for the floor. Kerosene and kerosene stoves should also be provided to populations in camps. As with shelter repair kits, these tent upgrade programmes will be primarily run as a distribution, with additional technical support provided. Camp / community tool kits may also be provided to support the digging of drainage – a key part of the shelter.

2.2 Introduction - Shelter priorities

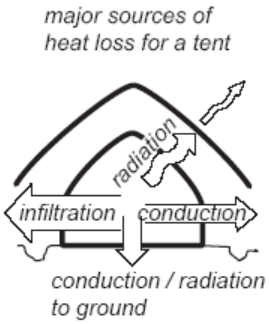
The key shelter priority is to keep the immediate space around bodies warm. This is provided primarily by **warm clothes** and **bedding**. The key needs are for **blankets**.



The secondary shelter priority is to provide protection from the elements, by providing a **waterproof roof**. Adequate Drainage is also needed, so **tools** are needed to help prevent tents from flooding.

Ground insulation and bedding is key in preventing heat loss to the ground, and will help survival through periods of cold. **Providing thick quilts or high quality** blankets can provide personal insulation from the ground, whilst closed cell foam, or raised wooden floors will reduce this heat loss. **Plastic sheeting** is a key basic flooring component preventing rising damp.

To ensure a warm living environment, wind proofing is essential. Draughts can be blocked by **plastic sheeting**, **canvas**, or **blankets** over gaps. Draughts can also be blocked at ground level by **building low walls** (or excavating downwards if there is no risk of flooding). Additional **Tools** may be required to complete this.



The use of stoves to heat internal spaces is dependent on the fuel availability, and choice of stove must take into account of where the fuel comes from. Cooking and heating functions of stoves should be considered separately and care needs to be taken with reducing fire risk. Smoke is a common cause of respiratory infections and eye disease. Care should also be taken with toxic exhaust gases such as carbon monoxide build up.

3.0 Tents

3.1 What is a winterised tent?

A winterised tent[1] **must** be made of **waterproof canvas**, and must have a **strong supporting frame**. It must provide a **minimum of 12m^2** (130ft^2) covered area. Additionally, a winterised tent has the following components:

Fly sheet
- separate fly sheet, usually made from canvas, which fits over the inner tent.

Flue manifold.
- The inner tent and flysheet each have a metal plate with a hole in it. These plates are sewn in or fixed into a canvas pocket. This allows for a stove with a chimney to be placed inside the tent without the risk of the flue pipe igniting the canvas when hot.

Structural supports.
- The poles which form the vertical supports and the ridge beam should be made of a thick gauge steel (min 1.5mm) and with an external diameter of 35-50mm. This gives suitable structural resistance to both high winds and snow loading.

Inner lining.
- The inner tent may have a light cotton ('desouti') lining.

mud flaps / valences
- The tent must have rot proof mud flaps of suitable quality and length to allow the tent to be dug into the ground.

3.2 Beneficiary adaptation of tents

Beneficiaries have been observed to upgrade tents in many ways. Sensible adaptations should be encouraged. Observed strategies adopted by beneficiaries include:
- raising floors with timber or stone to reduce draughts and increase insulation.
- digging in of valences /mud flaps to reduce drafts and risk of flooding.
- construction of low walls, potentially head height walls to increase thermal mass and reduce drafts.
- Use of plastic sheeting or blankets over closed ends of tent to reduce drafts.
- Use of stoves for cooking and heating at key times of the day when cold is most intense.
- excavating the interior space of tents to reduce ground level drafts where there is adequate drainage.

[1] Detailed specifications of a winterised tent can be found in Emergency Relief Items Vol. 1 Compendium of Generic Specifications Hhttp://www.iapso.org/pdf/erc_vol1.pdfH
performance specifications can be found in "tents" published by UNOCHA (see bibliography)

3.3 Tent winterisation upgrade kit contents

The basic materials required to winterise a tent are plastic sheeting and rope with blankets and floor insulation for personal shelter. Below are the priority items that a family will need to provide for tent winterisation. The remaining materials to be distributed will depend on what families have already possess:

Quantity	Material	Use
First priority		
2 per person	Blanket or quilt - high quality*	Personal shelter - ground insulation and personal cover
60m^2	plastic sheet**	covering - waterproofing / flooring
20m	20m Rope – UV stabilised	structural -support / fixing sheeting
	warm clothes. ***	Personal shelter
Second priority		
1x	Needle and 20m thread	structural - basic tent repairs and draught proofing
25m	5mm cord	structural - support / fixing sheeting
Third priority		
4mx4m	plastic straw mats / 10mm closed cell foam / carpet underlay****	Flooring
Fourth priority		
1	Cooking stove, heating stove 4 months fuel	Cooking – higher priority than heating. Type of stoves dependent on fuel availability.
2-2.5m	chimney pipe with bend for stove. Valve on flue to control flow	Chimney for stove if appropriate, 1.5mx1m chicken wire to prevent metal from touching tent.
Structural support – if required		
1 set	2m Steel Metal tent pole set – 1.5" diameter, 1.5mm min wall thickness	Replacement of damaged poles. – 2 upright, 1 cross piece jointed in middle. Alternatively, replacement tents may be provided for those most in need.
Community support		
1 per 20 families	Spade and pick axe	Community toolkit to help with digging of drainage and construction of low tent walls

* minimum 2 high quality wool blankets **per person** (minimum TOG value of 2.0). If high quality synthetic blankets (generally brightly patterned fleece type material) or thick quilts are used, fewer than 2 may be used. Mattresses are the preferred form of ground insulation, but are subject to logistics constraints.

> **sphere NFI standard 1 guidance note 3:** "*Provision of insulated sleeping mats to combat heat loss through the ground may be more effective than providing additional blankets*"

** clothes **must be winter clothes**, clean, compressed, sorted by age/size and gender and culturally appropriate.

> **sphere NFI standard 1 guidance note 3:** "*Changes of clothing: individuals should have access to sufficient changes of clothing to ensure their thermal comfort, dignity and safety. This could entail the provision of more than one set of essential items, particularly underclothes, to enable laundering*"

*** plastic sheeting - (OXFAM/MSF quality preferred, reinforced with bands) to wrap the tent and cover the floor. This corresponds to two or three 6mx4m plastic sheets.

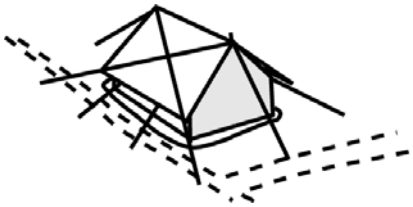
**** general ground insulation reduces ground heat losses. Partially flooring a room with blankets and plastic sheeting will allow people to sit reducing direct conductive heat loss.

Note that sandbags may also be used in the construction of basic walls.

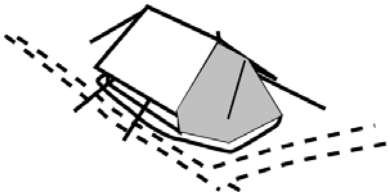
3.4 Use of tent winterisation upgrade kits

Tent winterisation upgrade kits are intended to support beneficiaries in upgrading their own shelters. Below are some sketches of how people may take steps to winterise their shelters with basic materials. Note in extremely cold areas where heating is not available, reducing headroom and living space will reduce the volume of air to heat. In other areas, increasing headroom may make a space more liveable.

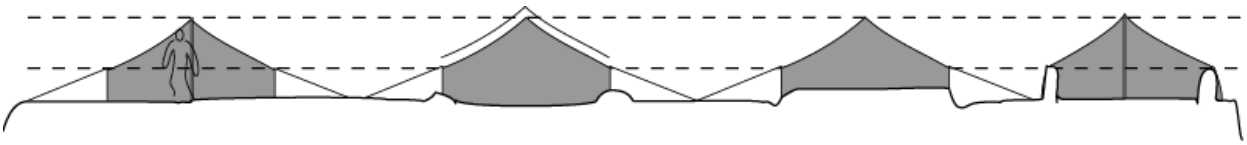
blanket or plastic sheeting covering unused door. note drainage ditches and site drainage around tent



plastic sheeting on roof tied down by rope



Porch area/ extension added with additional plastic sheeting



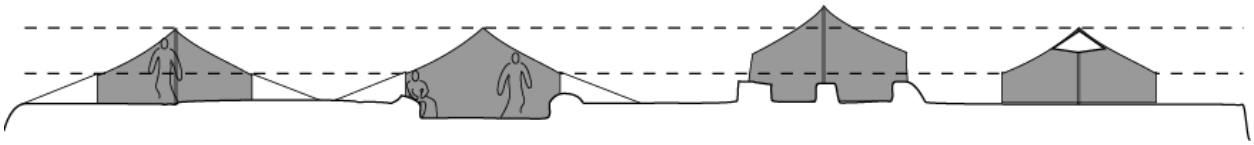
tent as originally erected

tent with plastic sheet waterproofing fly

tent with raised floor (wood or earth/stone)

tent with low earth/stone walls

Methods of winterising tents to reduce draughts and increasing waterproofing. Note drainage ditches



tent as originally erected

tent with excavated floor

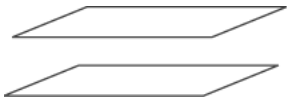
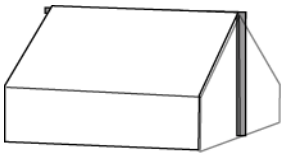
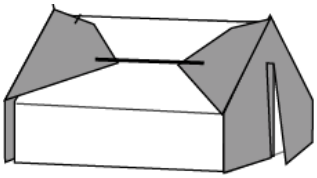
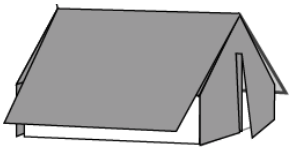
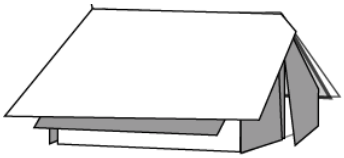
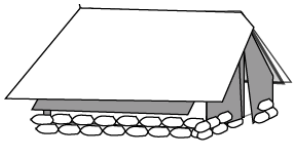
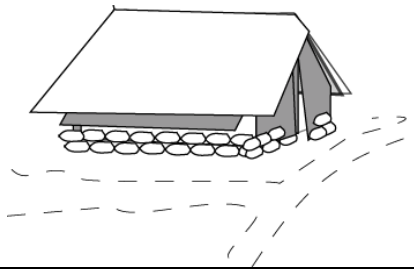
tent raised on blocks

tent with lowered roof to increase warmth

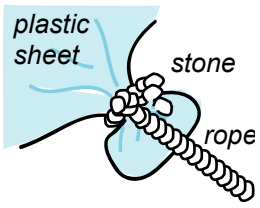
Methods of increasing headroom for comfort by excavating floor or constructing tent on raised walls, or lowering headroom to increase warmth. People should be allowed to adjust tents as they find comfortable.

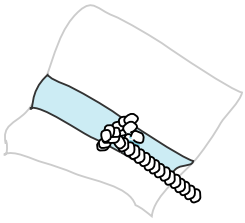
Tent winterisation

This page contains sketches of how plastic sheeting; rope and sand bags may be used to winterise a tent. There are many approaches that may be taken, this is solely meant to illustrate on such approach.

<table>
<tr><td colspan="3">Basic steps for insulating a ridge tent with plastic sheeting
(This is an example only – there are many ways of insulating a tent)</td></tr>
<tr><td></td><td>  </td><td>  </td></tr>
<tr><td>1. Select a well-drained and suitable site, noting prevailing wind and other features.</td><td>2. Lay ground sheet with insulation underneath or with mats on top</td><td>3.erect inner tent</td></tr>
<tr><td>  </td><td>  </td><td>  </td></tr>
<tr><td>4. Fold plastic sheeting over ends of tent tie the “ears” together</td><td>5. Cover the roof with a sheet of plastic (min 6mx4m)</td><td>6. Put on the flysheet</td></tr>
<tr><td>  </td><td colspan="2">  </td></tr>
<tr><td>7. Cover the mud flaps with earth or with filled sand bags (20kg bags easiest)</td><td colspan="2">8. Dig drainage ditches.</td></tr>
</table>

The sketches in this page are after Oxfam tent winterisation model
(This approach requires the following plastic sheets 6m x 4m - roofing, 2.5m x 2.5m - ends, 5m x 4m - floor allowing the sheet to cover the walls)



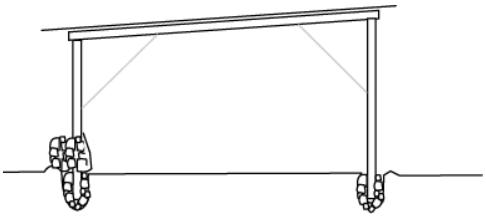


The strongest ways to attach plastic sheeting a by tying a cord / rope around a rock in the plastic sheeting (left) or through reinforcement bands in Oxfam/MSF reinforced plastic sheeting (right).

4.0 Self help emergency repair kits

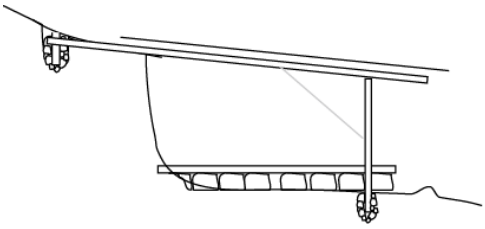
4.1 Introduction

There are many examples of how families and communities have already made improvised shelter for themselves and their livestock. This has occurred both unilaterally by affected families and communities as well as through programmes supported by agencies. Below are three typical structural types - which are evident across NWFP and AJK. These models may form the basis of more detailed agency proposals for self-help shelter assistance.



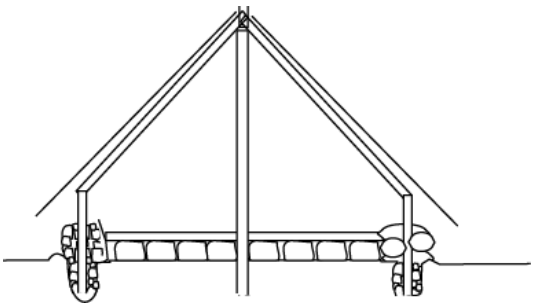
Lean to shelter

This type of shelter is effectively a basic shed. This is a common form of self build construction. The roof is generally made of metal sheet or plastic sheeting.



Terrace-lean to shelter

This model is the same as the lean-to shelter except that only a partial frame is built using the earth terrace to support half of the shelter and with the rafters dug into the side of the mountain.



A-frame shelter

An A-frame shelter has a steeply pitched roof with low walls on both sides.

4.2 Construction guidance

For temporary and transitional shelters, the following guidance should be observed:

Size

- above 5000ft: More adequate space than the 170sq. ft. (16m^2) covered space that a 4mx4m tent offers should be provided. The sphere suggested minimum of 38 sq. ft. (3.5m^2) covered area per person should be aimed for.
- Below 5000ft: More adequate space than the 130sq. ft. (12m^2) covered space that a 3mx4m tent offers should be provided. The sphere suggested minimum of 38 sq. ft. (3.5m^2) covered area per person should be aimed for.

However, agreed covered areas should not prevent people from being left in the cold due to logistic constraints.[2] Where less material is provided privacy, health and dignity issues will arise and further interventions may be required to support arising protection, health, and psychosocial issues.

Shape

Practically, shape and dimensions are dependent upon sheeting or roofing materials available.

- Rectangular structures have smaller roofing spans than comparable area square structures. And regular squarer shaped structures are preferred on earthquake resistance grounds.

Foundations

- Foundations should be a minimum of 1'6" ft. (450mm) deep, and be fixed in solid soil.
- Lean-to shelters must be securely connected to foundations above the terrace wall to prevent the roof from sliding off in aftershocks.

Frame

- The walls should be braced diagonally.
- There should be a ring beam at the top of the wall for lean to shelters.

Roof

- The roof should be tied into the walls
- The roof should be pitched to allow rain to drain away.

It is advisable to diagonally brace the underside of the rafters.

Walls

Walls are built within the timber frame with locally available material. This may be material such as timber planks, metal sheeting, sandbags or rubble.

- Unless masons are aware of earthquake resistant building techniques (through stones, well laid walls, corner ties, etc), traditional dry stone walling or sand bags should not be built to a height greater than 1m (to minimize injury should after shocks occur).
- Rubble walls should not be used to support the roof
- Plastic sheeting should be used to seal the mountain wall from the inside of the shelter for shelters that use the terrace as one wall.

Flooring

Compacted rubble and straw can be used to provide alternative but limited insulation. Plastic sheeting may also form a waterproof floor membrane. If available, timber planks can be used to provide insulated decking for the floor.

Drainage

- Drainage must be dug around the shelter.

Insulation

- Local available insulation material should be added to the floor, walls and ceiling

Priority 1 draught exclusion: use plastic sheeting, blankets or timber to stop draughts.
Priority 2 insulation: use pine needles, leaf bags or sheeting to insulate the walls and roof.

[2] note sphere Shelter and settlement standard 3: covered living space (www.sphereproject.org)

4.3 Suggested Self Help Shelter Repair Kit items

The key needs to support very basic shelter are warm clothes and roofing materials. Below is a basic kit list to support self help shelter repair.

Quantity	Material	Use
First priority		
8	CGI sheet*	10'x3', 28 guage, galvenised (or equivalent as available.)
48m2	plastic sheet**	Covering - waterproofing / flooring
5kg	Wire	structural -support / fixing sheeting
20m	20m Rope – UV stabilised	structural -support / fixing sheeting
10kg	Nails and roofing nails assorted	structural -support / fixing sheeting
Second priority		
1ea	Hammer, adz (axe), pliers, spade	Tools listed in order of priority
1	Wood burning stove for cooking and heating***	Cooking is a higher priority than heating.
2-2.5m	Chimney pipe with bend for stove. Valve on flue to control flow	Chimney for stove if appropriate, 1.5mx1m chicken wire to prevent metal from touching tent.
2kg	candles (with jar/lamp)****	Lighting - jar to reduce risk of accident
200	waterproof matches,	Heating, cooking, lighting
100	40kg Sandbags	structural sandbags for construction of low walls

* After blankets, roofing material should be seen as a priority, see tent winterisation guidance (section 3.3) above on blankets and other personal shelter items.

> **sphere Shelter and settlement standard 3: covered living space guidance note 5:** *Roof coverings: where materials for a complete shelter cannot be provided, the provision of roofing materials and the required structural support to provide the minimum covered area should be prioritised. The resulting enclosure, however, may not provide the necessary protection from the climate, or security, privacy and dignity, and steps should be taken to meet these needs as soon as possible.*

**plastic sheeting - (OXFAM/MSF quality preferred, reinforced with bands) to wrap the tent and cover the floor. (6m x 4m - roofing, 2.5m x 2.5m - ends, 5m x 4m - floor allowing the sheet to cover the walls)

*** steel should be a minimum of 24 guage.

**** candles provide illumination. They have a low but radiative heat output (10-20W) and provide very limited warming in shelters. They may provide a psychological feeling of warmth. Wicks should be lead free. A lamp to put them in is a key part of fire safety.

5.0 Stoves, fuel and cooking

5.1 Introduction

Fuel is burned in tents for **cooking** for **heating** or for **lighting**. Although cooking may provide warmth, it is different in function and needs from heating, and different types of stoves / cookers may be required. With both cooking and heating, the key is to identify the fuels to be used.

Heating, although important, is a lower shelter priority than warm clothes, good quality blankets, quilts and mattresses, and a waterproof and draft proof shelter.

Cooking and especially heating require significant amounts of fuel. Organisations should select the fuel to be used before selecting a stoves or heater. Generally non-displaced, rural people will have better access to firewood, and access will limit delivery of other fuel sources. **There is no single fuel type available to all earthquake-affected people and different available types of fuel and stoves should be used to support people.**

Open fires should be discouraged inside tents.

5.2 Fuel types

The most commonly used energy sources for heating in the affected regions are listed below. In many cases, fuel use is limited by cost to people. For effective support for populations, all energy sources should be supported as far as possible. For displaced populations, kerosene and coal should be distributed.

- **Wood** (especially in rural areas), Displaced people have reduced access to firewood. Transporting firewood or charcoal into towns has significant environmental issues.
- **Coal** is commonly used for heating in cities. However fumes and toxic smoke, especially in confined spaces mean that it should only be used inside with a chimney.
- **Kerosene** is commonly used for heating in cities. (For heating 1 litre/day minimum will be required per shelter, though more than 2 litres is preferable.
- **Gas** is available and used for heating in cities. In poorer communities and villages it is used only for heating water and for some cooking.
- **Electricity** can be used in cities where the cabling and supply can cope with the demand. This is the most expensive option, but safest in terms of fire, smoke and fumes if secure wiring can be put in place.
- **Charcoal** although effective and less smoky than wood contains significantly less energy than the wood from which it came.

5.3 Cooking

- **Wood** Commonly self built cooking stoves range from the inefficient three stones stoves to mud stoves with wind shields that closely fit cooking pots which should be encouraged. To meet basic cooking needs, a minimum of 2kg of firewood is required per person per day.
- **Gas** cookers are popular but prove expensive to run especially for rural people.
- The safest **kerosene** stoves consist of a reservoir of kerosene with cotton wicks. Pressurised primus stoves may heat water quicker but are more dangerous and may need regular cleaning.
- **Electric** cookers may be relatively safe but are expensive and require suitable mains supplies and infrastructure to power.

Communal kitchens are sometimes set up to provide food for large groups of people. If set up, these must be set up with care for both public health and socio cultural reasons.

5.4 Heating

Wood and **coal** stoves can greatly increase efficiency of fuel burning. If used in tents they must be supplied with a chimney. Their efficiency can be improved by surrounding them with stones / earth to retain heat. Choice of stoves should be based on:

- fuel efficiency - this is based on various factors (this does not include energy saving measures such as cutting wood into small pieces)
  - size of combustion chamber. This should be approximately 8”x8”x8”
  - butterfly valve / control valve on chimney.
  - ability to control rate of air flow into stove
  - presence of internal jacket to control heat radiation
  - size of wood that door will take
  - long chimneys to dissipate heat within tent, and draw smoke.
- cultural appropriateness – including whether there is space for a chapatti pan or not
- durability of stove (made from minimum 24 guage steel)
- quality of manufacture - lack of leaks

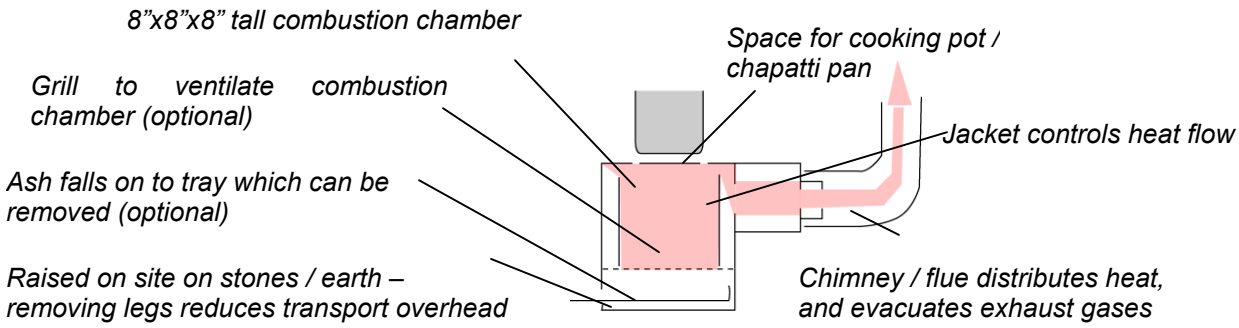


fig 4.4 simple wood / coal heating / cooking stove design with small combustion chamber (200mm maximum height of combustion chamber)

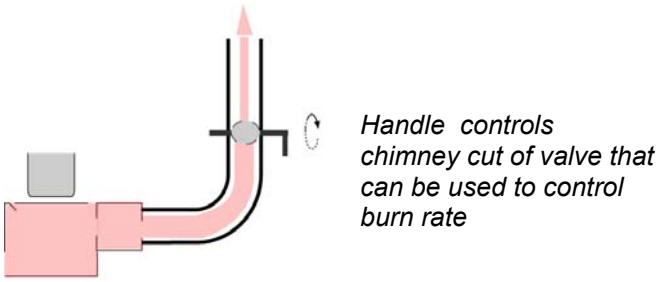


fig 4.4 simple wood stove with chimney detail showing how a simple modification to the flue can increase user control over the fuel burn rate and increase efficiency.

Gas stoves are expensive to run and canisters are bulky to transport. Although popular in cities, fuel provision issues prevents general distribution of gas stoves in rural areas.

Kerosene heaters are either driven by pumping a pressurised reservoir, or drip-feeding onto kerosene onto a hot metal plate.

Electric heaters may be relatively safe but are expensive and require suitable mains supply and infrastructure to power.

Candles produce light and a psychological feeling of warmth. They may give a subjective feeling of warmth. They must be protected in a jar to reduce fire risk.

5.5 Fire risk

Tents are highly flammable, and stoves and chimneys should not touch canvas. Stoves with chimneys must have at least 2.5m of metal piping and a cap at the end of the chimney to prevent sparks falling back on the tent and rain entering. A chimney may be kept away from tents by:

- Passing it through 40 cm metal plates in existing chimney holes in the roofs of winterised tents. (fig 4.5a)
- Wrapping it in 1.5m of chicken wire or wire mesh and then passing them through an end or side wall of the tent. (fig 4.5b)
- Passing it through the ground or a through a low stone and earth wall. (fig 4.5c)
- Using rockwool or similar fireproof cloth around the pipe.

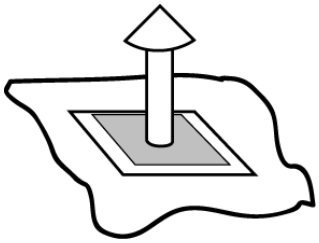


fig 4.5a chimney passes through metal plate in roof

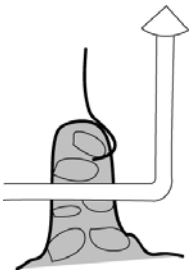


fig 4.5b chimney passes through low earth / stone wall

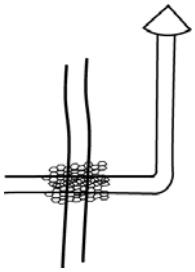


fig 4.5c chimney covered in chicken wire and passes through canvas tent wall

6.0 Further reading

The book "cooking options in refugee situations - a handbook of experiences in energy conservation and alternative fuels" is available from the UNHCR website.[3] It is relevant for both cooking and heating programmes.

"The sphere Humanitarian Charter and minimum standards in disaster response[4]" contains standards on shelter and Non-food items standard in section 4 of the shelter chapter, as well as other standards on shelter and participation.

"Tents" published by UN/OCHA[5] contains simple information on the use and deployment of tents.

"Transitional settlement displaced populations"[6] discusses the strategic settlement options as well as specific shelter programme issues

[3] http://www.unhcr.ch/cgi-bin/texis/vtx/protect/opendoc.pdf?tbl=PROTECTION&id=406c368f2
[4] www.sphereproject.org
[5] http://ochaonline.un.org/GetBin.asp?DocID=2112).
[6] www.shelterproject.org