PALESTINE
SHELTER CLUSTER
Coordinating Humanitarian Shelter and Settlements

COMMUNITY-BASED SHELTER RESPONSE MODALITIES IN THE CONTEXT OF THE GAZA CRISIS

TECHNICAL GUIDE FOR MAKESHIFT SHELTER RESPONSE

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SHELTER CLUSTER PALESTINE
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Executive summary

This technical guide documents community-built makeshift shelter solutions in Gaza and translates observed good practices into safe, low-cost, non-structural recommendations partners can support at scale. Drawing on field visits, photo documentation, and local innovations, it presents three common shelter models and a set of practical upgrades for structure, sheeting, drainage, ventilation, privacy, and basic WASH, alongside critical safety (UXO, fire), HLP, and protection considerations. The intent is to help organizations design supportive programming (kits, technical help, IEC) that strengthens self-help while minimizing risk and environmental harm.

Disclaimer

This document is a technical field guide produced by the Shelter Cluster Palestine (Gaza Local Coping Strategies TWG) with partner contributions. It reflects current operational constraints and will be updated as conditions evolve. The guidance focuses on non-structural measures; any structural work requires qualified engineering oversight. Always follow UXO safety advice from the relevant actors.

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Introduction

Amid the worsening humanitarian crisis in the Gaza Strip, repeated displacement orders, and the urgent need for shelter under the ongoing blockade restricting humanitarian aid and the scarcity or absence of construction materials in the market, residents have demonstrated exceptional resilience and innovation in repairing and improving their temporary shelters using available resources in their surroundings. This report aims to document and analyze field-observed coping mechanisms and some good field practices for makeshift shelters, highlighting the capacity and the resilience of the people in Gaza, to guide partners in developing their programming.

The report is based on direct field observations, analysis of social media content documenting daily life in Gaza, and a review of thousands of images showing emergency makeshift shelter practices.

Scope of this guide: This document outlines the community-driven coping mechanisms in Gaza, focusing on the widespread use and adaptation of makeshift shelters as self-recovery solutions. It highlights how affected populations have undertaken low-cost, light-touch improvements, such as improved sheeting, bracing, drainage, ventilation, internal partitions, and basic WASH facilities to increase safety, privacy, and habitability within severe material and access constraints.

Critical safety: Do not excavate, collect rubble, or disturb debris without UXO risk education and coordination with UNMAS and relevant actors.

Section 1: Models of makeshift shelter

Model 1: Shelter made of wooden frame and multi-material covering

This model represents the most common solution for families who have completely lost their homes or have been displaced to open areas. The shelter comprises:

- **Structure**: The frame is typically made of timber, this timber is either purchased from local markets or salvaged from destroyed buildings, damaged furniture, or wooden pallets used in aid deliveries. Timber is used to build the main frame, divide interior spaces, and create windows, doors, and even simple furniture.
- **Covering**: Tarpaulins (either new from aid or used and bought from the market) are the most commonly used materials for roofs and walls. When tarpaulins are not available or to enhance thermal and water insulation, residents often use thick fabrics, blankets, or even nylon sheets. However, these provide limited to no protection from rain.

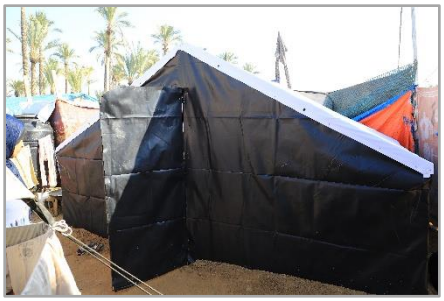
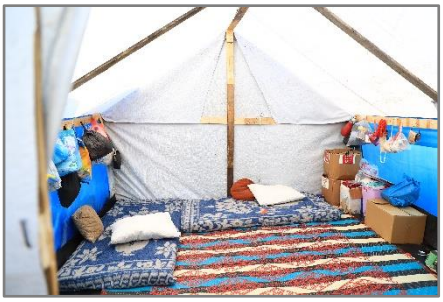

Figure 1 Example of Makeshift shelter (Wood and tarpaulins) Gaza, HEKS/EPER July 2024

The Shelter Cluster has developed a full technical guide covering the use of emergency shelter kits in the construction of emergency shelters within the context of Gaza, with annexes of relevant IEC materials. For more details, refer to the ESK technical guidance and IEC materials[1].

Model 2: Shelter made of reclaimed cement blocks from rubble

- **Walling:** bricks are often purchased from second-hand material vendors or salvaged directly from the debris of buildings that have been entirely or partially destroyed. They are collected, cleaned, and prepared for reuse. **The brick structure** is usually built to a suitable height, often around 2.1 meters.
- **Mortar:** Typically, bricks are laid using cement mortar. However, due to the scarcity or high cost of cement, a mixture of clay and straw is used as an alternative bonding material between the bricks.
- **Roofing:** To cover the roof, wooden beams are covered with tarpaulin, with a sloped roof to allow rainwater to drain. If a tarpaulin isn't available, Gazans have devised a two-layered solution: the first layer consists of thick blankets or dense fabric (such as sewn-together old clothes) for privacy; the second is a layer of thick nylon (like flour bags, sugar sacks, or repurposed agricultural plastic), which is placed directly on top of the fabric at an angle to direct rain away. Stones or other weights are used to secure the edges.
- **Sealing Openings:** In this shelter, Gazans reuse salvaged materials to meet essential needs. Reused doors extracted from rubble are installed, or temporary doors are made from wooden planks wrapped in nylon, attached with old hinges or even wire to allow for opening and closing. Windows are positioned about 1.2 meters above ground level, using available salvaged windows or creating openings in the wall covered with taut transparent nylon, which can be rolled around a piece of wood to open or close.
- **Kitchen and toilets:** Households prefer having separate cooking and bathing space beside the main living space in the shelter, with a temporary soak pit for draining wastewater from both facilities.

[1] ESK guidance: 20250515_OPTSC_ESK Technical Guidance_V1_Issued.pdf
IEC-How to build an ESK | Shelter Cluster

A key recommendation for this approach is to *ensure the production of a cohesive and effective mortar mixture for construction purposes, it is recommended to use clay soil at a ratio of 30–40% to provide flexibility, while avoiding excessive amounts to prevent cracking. Sand should be added at a ratio of 40–60% to enhance cohesion and reduce shrinkage. Fine gravel is also added to increase strength and minimize cracks. Organic fibers (such as straw, fiber, or animal hair) are recommended at a ratio of 5–10% to improve internal bonding. An appropriate amount of water should be added to facilitate mixing without compromising the consistency of the blend.*

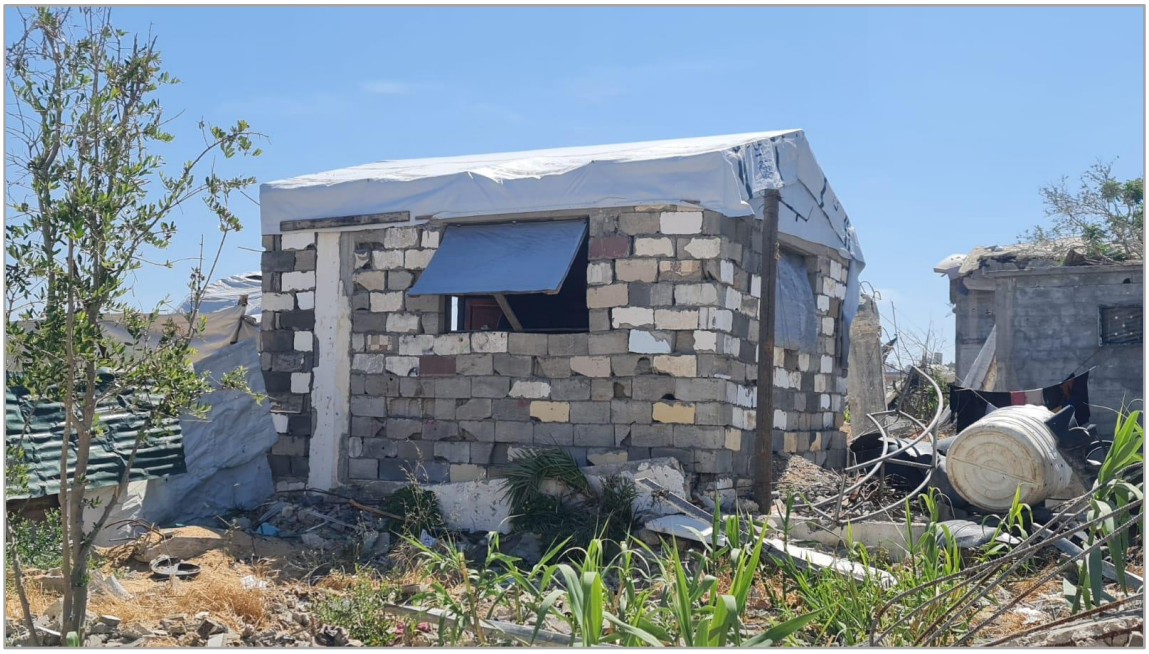

Figure 2 Temporary shelter made of reclaimed blocks

Model 3: Earth Bag Shelter

Under harsh displacement conditions and limited resources in Gaza, some displaced individuals have resorted to building temporary shelters using flour sacks filled with sand and mud, offering a practical and sustainable alternative. There have been a few cases of earthbag shelters built by households in Gaza, but there are constraints to scale this up due to limited availability of sand bags, sand, and land.
One resident along the Gaza shoreline collected approximately 1,200 flour sacks, filling them with sand and mud to construct the walls of his shelter. He then applied an additional mud layer to stabilize the blocks, creating a more structurally sound alternative to traditional tents.

These sacks are typically stacked in an interlocking pattern like bricks and securely bonded with mud between the layers. This method enhances resistance to external elements such as wind and rain, while the mud walls also help regulate indoor temperature. The materials are widely available when flour is distributed by international organizations. Given the low cost of used sacks and the easy access to sand from

the beach, the construction cost of such shelters is relatively low, starting from around $300, provided the sacks are available.

The effectiveness of this technique can be improved by following proper installation steps for the walls:

- Thoroughly filling the sacks with sand and mud without voids,
- Carefully stacking them like proper masonry,
- Using mud to fill gaps for cohesion, and
- Sealing the roof with either a nylon sheet or a waterproof mud layer.
- Adding a simple ventilation opening or window also boosts functionality.

For roof coverage, either the wooden frame and tarpaulin system from the previous model can be used, or an arched roofing method may be employed, provided skilled workers and appropriate engineering supervision are available.

Section 2: Practices observed in Makeshift shelters

This section was developed based on an in-depth technical visit of existing field practices, conducted at more than 60 makeshift shelters in the Deir al-Balah sites in September and October 2024, with an average of three visits per site. These visits were carried out in collaboration with a specialized technical team and included documentation of the most effective practices implemented on the ground.

- **Foundation and stabilization of wooden supports**:
  Holes are dug for columns at sufficient depth (20–30 cm), ensuring they aren't excessively wide. The base is compacted and filled with gravel or stones for stability. To prevent wood decay due to soil contact, the lower part (40–50 cm) is wrapped in multiple layers of nylon, secured with tape. Columns are kept fully vertical during backfilling.

- **Reinforcing the structure with diagonal Braces**:
  Field evaluations and technical support have shown that using diagonal wooden braces connecting vertical posts to horizontal beams is a **very good practice** for strengthening the structure against horizontal forces (e.g., wind and vibrations).

  - At least one brace should be installed on each side of the shelter.
  - Braces should be securely fixed at an angle close to 45 degrees.
  - The ends of the braces should be cut precisely to ensure full surface contact with other elements.

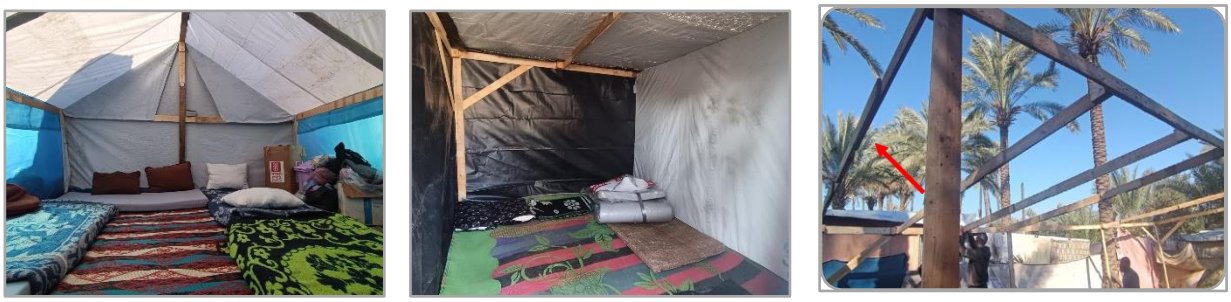

Figure 3 Using folded tarp pieces under nails HEKS/EPER July 2024

- **Choosing appropriate dimensions**:
  Field assessments indicate that most beneficiaries prefer a minimum internal height of 2.1 meters to allow standing and movement inside the shelter.
- **Installing and securing coverings (Sheeting)**:
  Covers are fastened to load-bearing points at even intervals using clout nails. In the absence of these nails, pressure is distributed using plastic caps (e.g. bottle tops, tubing) or folded tarp pieces under each nail to prevent tearing.
- **Slope and drainage**:
  Field monitoring highlights the importance of proper slope and secure tarp installation to ensure rainwater drainage and prevent sagging of the tarpaulin.

    - This is achieved by tightly stretching the tarp at an appropriate angle.
    - Adequate support points (purlins) are distributed underneath for stability.
    - Some residents use salvaged cement blocks or sand-filled water bottles as weights to secure the tarp edges and resist wind.

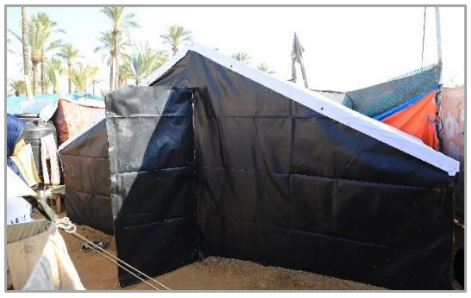

Figure5 Slope in Makeshift shelter (HEKS/EPER, July 2024)

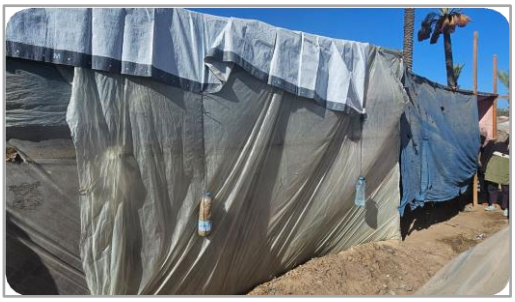

Figure4 Using plastic Bottles filled with Sand to fix tarp, HEKS/EPER

- **Improving flooring and internal ventilation**:
    - A tarp layer is placed over the entire floor, or a raised floor is created using salvaged cement blocks or old wooden boards to maintain dryness and thermal insulation.
    - Cross-ventilation openings help renew air inside the shelter and improve comfort.

- **Thermal insulation and summer cooling**:

  To combat heat, some residents added an extra tarp layer above the roof with a 50 cm air gap or set up a separate shade above the shelter. Old blankets were used on interior walls for winter insulation. Small top openings between the structure and roof covering helped increase air circulation.

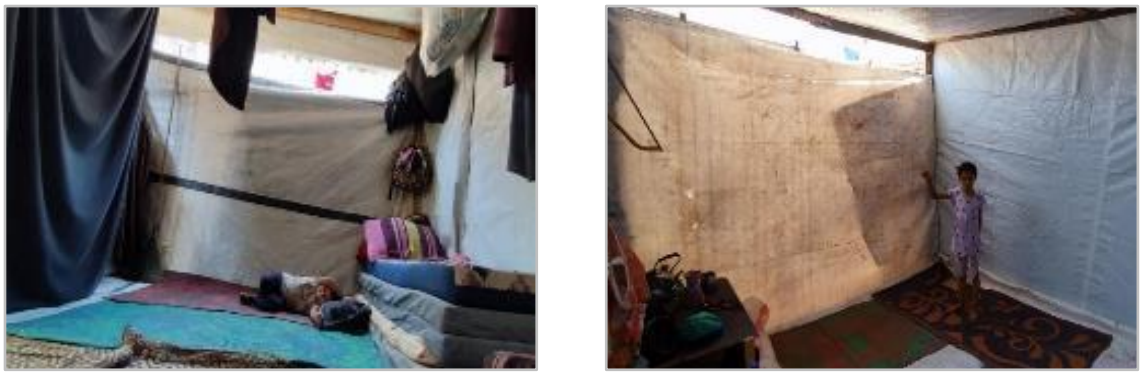

Figure 6 Leaving an upper air gap to improve thermal comfort (Source: HEKS July 2024)

Additionally, a common practice to cope with heat is creating a shaded outdoor extension to the shelter, open on the sides, used for family gatherings and children's play.

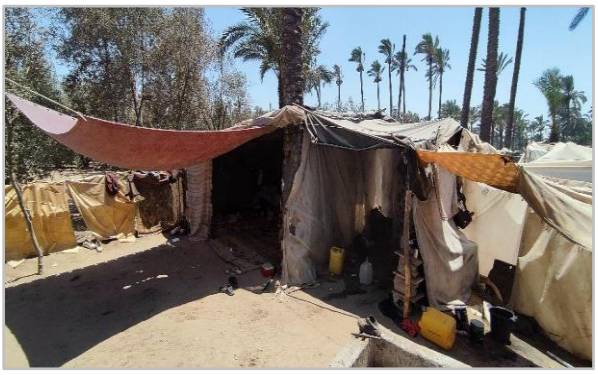

Figure 7 Covered outdoor space for family gatherings (Source: HEKS/EPER July 2024)

- **Internal partitioning for privacy**:

  Fabric pieces or curtains are used to create internal dividers for sleeping or living areas without complex structures.

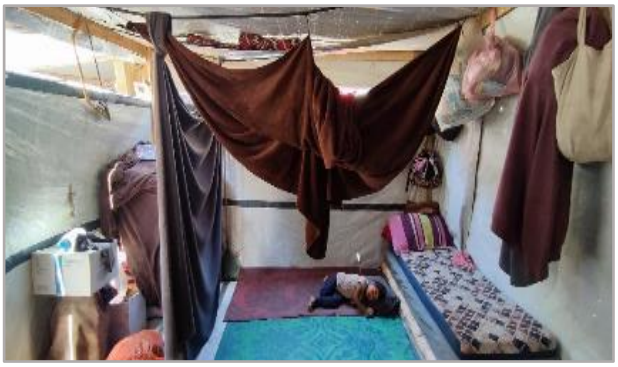

Figure 8 Using fabrics to create internal partitions in the shelter (Source: HEKS/EPER July 2024)

- **Sanitation Facilities**

Due to the scarcity of resources, residents in Gaza have devised practical solutions for creating sanitation facilities using salvaged materials:

- **Structure and materials**: Materials such as plastic tarpaulins or zinc sheets are used for cladding, supported by wooden posts or cement blocks salvaged from rubble.
- **Toilet construction**: Reused toilet seats in good condition are installed. Alternatively, toilets are built using cement blocks at an appropriate height.
- **Plumbing fixtures**: Salvaged plumbing accessories like faucets and pipes are reused if found in good condition.
- **Drainage**: Temporary soak pits are constructed near the sanitation facility. These pits are reinforced with perforated cylindrical zinc sheets to ensure proper water seepage.
- **Flooring**: Floors are covered with reclaimed interlock tiles, marble chips, or ceramic tiles to improve hygiene, especially in the bathroom area.
- **Ventilation**: Two small opposing ventilation openings are usually made at the top of the walls to circulate air and reduce heat.

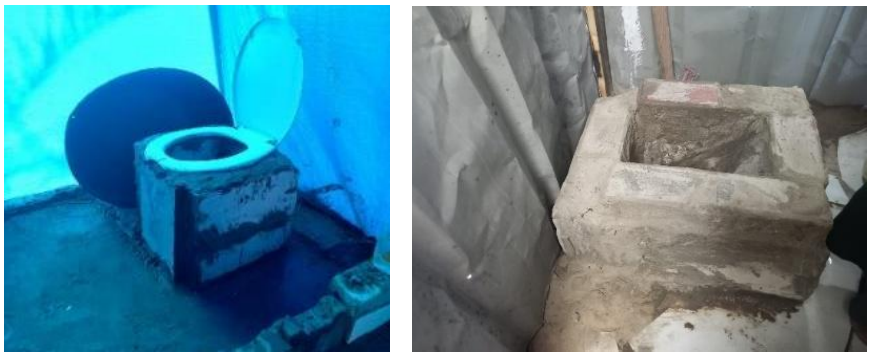

Figure 9 Toilet seat made of reclaimed blocks (Source: HEKS/EPER July 2024

- **Cooking Areas**
  - Residents have developed practical and resourceful methods for setting up cooking spaces using salvaged and reused materials:

- **Cooking platforms**
  - Often constructed from reused wooden planks taken from old pallets.
  - These platforms are covered with waterproof plastic sheets or reclaimed tiles to create a clean and functional work surface.
- **Alternative construction**
  - In some cases, cement blocks are used to build sturdy bases for cooking platforms.
- **Washing basins**
  - Old plastic water tanks are repurposed by cutting and reshaping them to serve as wash basins.
  - Drainage holes are added to ensure proper water flow.

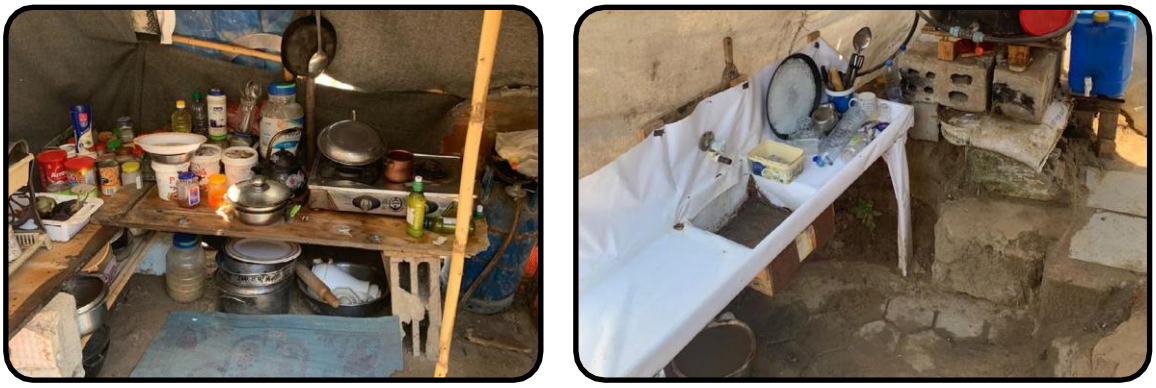

Figure 10 Various forms of cooking areas (Source: HEKS/EPER, July 2024)

- **Additional innovations**:
  - Cement blocks are also used as support for furniture or as weights to secure coverings.
  - Damaged plastic barrels are repaired and reused for water storage, which is especially important given the limited availability of clean water.

Challenges and Limitations

1. **Limited access to materials**:
   Due to the ongoing blockade, restrictions on the entry of construction materials, and widespread infrastructure destruction, residents face severe shortages in essential building supplies.
2. **Weak engineering standards and structural safety**:
   Many shelters are built without stable framing materials, raising concerns about their stability and weather protection for households, especially under wind loads or heavy use.
3. **Lack of sustainable technical supervision**:
   Most construction is carried out by residents themselves without technical training. This can lead to errors that compromise shelter safety. Technical support from organizations is limited and does not cover all areas or cases.

4. **Risk of Unexploded Ordnance (UXOs)**:
   Collecting rubble from destroyed buildings may expose residents, especially children and women, to UXO hazards. UNMAS reports indicate that 30% of destroyed buildings may still contain unexploded ordnance after military operations.
5. **Lack of legal protection for Housing, Land, and Property (HLP) rights**:
   Building shelters on unowned or undocumented land may expose families to eviction or community disputes. Weak official documentation and the absence of dispute resolution mechanisms, due to the diminished role of local governance, exacerbate the issue.
6. **Degradation of reused materials over time**:
   Harsh summer heat, cold winters, and climate change increase stress on shelters that lack proper insulation. Ventilation and cooling solutions are often temporary and limited in effectiveness.
7. **Environmental pollution**:
   Improperly constructed soak pits pose health risks by contaminating groundwater and spreading disease.
8. **Social and psychological challenges**:
   Repeated displacement and living in temporary shelters undermine feelings of safety and privacy, negatively impacting mental health, especially for women and children. Adaptation is not only physical but also requires a supportive psychological environment and relative stability.

Section 3: Practical recommendations for supporting organizations

Based on the detailed technical analysis of current practices and the challenges facing emergency shelter models in Gaza, the following recommendations are offered to support organizations and institutions working in the shelter sector. These aim to strengthen local adaptation mechanisms and improve living conditions in a safe, effective, and sustainable manner.

1. General Principles

- **Respect for Housing, Land, and Property Rights (HLP):** It is essential to adhere to property rights principles when selecting shelter sites or using rubble from buildings, to avoid future conflicts.
- **Safety from Unexploded Ordnance (UXO):** Beneficiaries must be made aware of the risks of landmines and unexploded ordnance, especially during excavation or rubble collection, with prior coordination with the relevant authorities before carrying out any such activities.
- **Awareness of War Remnants Hazards:** Communities should be educated about the forms of war remnants and methods of protection from them and encouraged to purchase used tools only from trusted outlets.
- **Fire Safety:** Raise awareness on fire hazards and prevention methods, such as maintaining safe distances around heat sources and using designated and safe cooking areas.

2. Shelter Tools Design and Distribution

- **Sealing-Off Kits (SoKs):** It is recommended to design the kits as durable backpacks with strong zippers, capable of carrying tarpaulins, ropes, and plastic adhesive tape, to ensure ease of transport and use, especially during emergencies and sudden displacement.
- **Number of Tarpaulins:** It is recommended to include at least three tarpaulins per kit, preferably in light colors, with white being most suitable.
- **Wood Specifications:** Households use primary wooden sections of 5×5 cm and horizontal supports of 2×5 cm.
- **Fixing Accessories:** It is recommended to include metal angles (screws/hinges) and corner brackets in the wooden kit to improve strength and durability.

3. Technical and Community Support

- **Field Support:** When possible, provide mobile technical support teams to assist households in applying best practices. If this is not feasible, alternatives should be provided, such as instructional printouts, a support hotline, or empowering local communities to raise awareness and promote self-help.
- **Linking Temporary Shelter Interventions to WASH Services:** Integrate shelter assistance with basic water, sanitation, and hygiene services, such as small water tanks distribution, temporary toilets, and hygiene kits. Coordination must be ensured with the WASH cluster.